THE

FIELD NATURALIST,

AND

SCIENTIFIC STUDENT.

[COMPLETE.]

EDITED BY

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Miembro Corresponsal de la Sociedad de Ciencias fisicas y naturales de Carácas.

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PREFACE.

THE *Field Naturalist* was projected on a plan that received the approbation of many well-known men of Science, and, amongst others, had the good wishes of the late Charles Darwin. It has also had the co-operation of many active workers in various departments of investigation, and its pages have contained many communications of interest and importance. In conveying thanks to those who have rendered help, the editor has also to confess that those for whom it was specially intended have not responded in the manner that was anticipated. The result has not been commensurate to the labour and time expended, and the task, although pleasant, is therefore brought to a close. It is hoped that those who may take up the *Field Naturalist* in its complete form, will find in it a fund of matter, both pleasant and profitable.

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THE FIELD NATURALIST

AND SCIENTIFIC STUDENT.

THE ARCHITECTURE OF THE WOODS.

Notes of an Out-door Lecture.

BY GEORGE MILNER.

IN Heber's *Palestine* there is a passage—probably the best known in the poem—which describes the silent building of the ancient Jewish Temple, and uses as an image the growth of a tree—

> Then tower'd the palace, then in awful state
> The Temple rear'd its everlasting gate:
> No workman steel, no ponderous axes rung!
> Like some tall palm the noiseless fabric sprung.
> Majestic silence!

I often think of these lines when I am walking through the green avenues of the forest. Noiselessly but surely and with unerring perfectness the multitudinous building is for ever proceeding.

Most people take some interest in the study of stone architecture, especially if it be ancient, and why not a similar interest in the architecture of the woods? It may be that the resemblances to Gothic architecture which are generally discoverable in the long colonnades, the diminishing vistas, and the pointed arch-branchings of a great wood are entirely fanciful, and have no actual connection with each other, but the likeness is there none the less, and it may present our subject in a new light if we pursue the idea of a parallel between the two kinds of building.

Let us ask, then, how the tree is built. First the foundations are laid in the dark earth. Before a single fibre is allowed to appear above ground, the root-tendrils are developed. These are few and rudimentary, but they are good for their office, and precede the superstructure. Afterwards the building of the two parts is contemporaneous, the foundations being widened and deepened just in proportion to the demands of the external erection. Next come the walls and broad pillars of the base—the strong bole or trunk, and from this rise the branches, which are the round, or the pointed, or the cusped arches of the building. And then comes the delicate tracery—the stems, the lithe twigs, the pendant leaves running hither and thither, and decorating the whole.

All good architecture implies the erection of a building for certain specific uses, and according to the principles of a certain style. The use is first and paramount, and if the building cannot be made to sustain fully the uses for which it was designed without breaking the rules of the style, it means either that the style chosen is a bad one intrinsically, or the wrong style for the particular purpose; or that the architect is himself inadequate for his work—a craftsman who is not master of his materials. But in this building of a tree both use and style are right and in harmony—the architecture subserves its purpose. First, the tree must have its hold upon earth. For that the root foundation is essential, and we have therefore a subterranean system of branches which cling to the soft earth, and lay hands, as it were, upon the hard rock. If you would understand how skilfully all this is accomplished, get into the bed of a mountain torrent in the dry season; and, where the winter floods have swept away the face of the bank, you will see exposed the mystery of the foundation, and learn how cunningly every fibre does

its work, now burrowing downward, now spreading out vertically, and always, if possible, staying itself upon the biggest boulder in its neighbourhood. Of course the roots have another function—the nourishing of the tree; but that is not a part of our present subject. I am speaking of the tree only as a piece of nature-building, and pass on to the trunk, which has a two-fold object. The root is for the earth alone, the trunk is both for earth and sky; it rests upon the one, but it aspires to the other; and to this end note how wonderfully strength is combined with flexibility, the power to hold with the power to yield.

In order to understand this you should carefully study the lines of growth in some great oak. Look, for instance, at some of those which may be seen at Trentham, and observe how wonderfully the curvature and twist of the lines in the trunk indicate the two objects—tenacious grasp of the earth—firmness as of the base of a lighthouse tower, and preparation for elasticity and grace above. If you wish to see an exemplification of strength alone, without the accompaniment of grace, look at the yew-tree in the church-yard at Darley Dale, the yew-tree which David Cox painted. Take the river-bank at Rowsley and wander up the stream. You will see a thousand graceful trees on the way; observe their beauty and then stand before the grim giant at Darley, with its vast girth—thirty-three feet at the least—and its dark iron-like colour, and you will understand what is meant by monumental strength in tree-building.

Turning now to the branches, we observe that these are not for the earth at all. Branch and twig and stem are for sky and wind alone, and for setting forth in the eye of the sun, through spring, summer and autumn, the flower, the leaf, and the fruit.

I ask you now to observe that, having these three main objects in view, each different species of tree has its own system of architecture; but so here, as with Gothic building; there is infinite variety within most definite limits. The Great Architect works according to precise law, and yet within the law, with unfettered freedom. An oak or a lime or an ash are always like others of the same kind, built on the same lines, according to the same style or plan, and yet none are ever alike. This is true beauty, beauty resulting from freedom within the bounds of law; and observe, all beauty is the same, whether it be that of nature or of art, of poetry or of life. A well-known writer has said that the growth of a tree is always in the direction of the unexpected. Now in a certain limited sense this is true; but in a wider sense it is not true. What strikes us most is that in the building of a tree the main lines are so rigidly obeyed. The seductions of a stream, the harsh resistance of a rock or a wall, the unpropitious blast of wind from some stormy quarter will change or warp the growth, and a grotesque effect will be the result; but through all this we see the native lines asserting themselves, and the tree doing its best to fulfil its own building according to the original plan.

Let me ask you now, in conclusion, to note some of the peculiarities of style in the trees by which we are just now surrounded. There is the willow which combines, as you may see, great beauty of decoration in its foliage, with singular rigidity and awkwardness in trunk and branch; the sycamore which makes the finest roof of leaves—to see that properly, however, you should stand with your back against the bole; the birch which shews the most delicate tracery; the lime, most beautiful and long-sweeping in its curves; the Lombardy poplar—the spire of the woods, and like other spires looking best in the twilight. The most perfect symmetry, however, and the especial beauty of clearness and simplicity is reserved, I think, for the young ash. Let those who have not hitherto studied the architecture of the woods dwell long on the beauty of a single twig, which may be cut from any one of these trees; familiarise the eye and the

mind with each curve and turn until you understand its meaning and object, and then, setting it against the light, sketch, however rudely, what you see, and *only* what you see. By such study you will come to know and feel the full beauty of those groves which were God's first temples—

> Ere man learned
> To hew the shaft, and lay the architrave,
> And spread the roof above them—ere he framed
> The lofty vault, to gather and roll back
> The sound of anthems.

ON THE SENSE OF LOCALITY IN ANIMALS.

BY THE HON. PERCY WYNDHAM, M.P.

BY the exercise of what power do animals find their way back to distant places from which they have been removed? It has been surmised that man may have once possessed this power, but that he has lost it in the process of evolution. The suggestion, whether true or not, throws no light whatever on the matter. No explanation worthy of the name has ever been attempted; and we must confess that in our present state of knowledge, we are unable to conceive or realise the power they possess. One thing only is tolerably certain—the knowledge of topography necessary to them to find their way, is not conveyed to them through the ordinary channels of the senses.

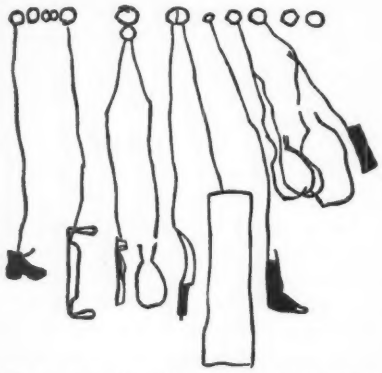
Of this power in animals, I know of two remarkable instances in my own knowledge. During the mastership of Mr. Millom Hartley, the late Lord Leconfield sent two foxhounds from Petworth to the Cumberland kennels. They went by rail from Petworth to London, were led across London, and again by rail from Euston Square to Dalston station. They remained for a month at the kennels there, going out with the hounds, when one day they simultaneously disappeared. Some days after—I do not remember how long—when the huntsman at Petworth opened the kennel door in the early morning, the first thing that greeted him was one of the hounds, who laid his paws on his shoulders. His companion was never heard of again. It is worthy of remark that the hound that reached home had more character than the other; but was draughted for skirting and running cunning.

In another case a badger was kept for four years in a loose box attached to a stable. He made his escape, and two days after he was dug out of a hole from which he had originally been taken. This badger must have recrossed a river to regain his home, which river he had crossed four years before in the bottom of a sack. He had been placed in a sack on capture, and not enlarged until he reached the place of his confinement.

Here is another instance, not within my own knowledge, still lower down in the scale of creation. At Falmouth, the crabs caught at the Lizard, some twelve miles distant, were taken to the harbour, branded with the mark of the fisherman, and placed in a box alive to await sale. The box was staved in, and the crabs escaped. Three days afterwards many of them were again captured at the Lizard. To reach this they must have found their way to the mouth of the harbour, and having arrived there, learned by some strange perceptive power in which direction their home lay; for it was far out of any possible range of vision, and they had been carried to their prison in a boat. It is suggested that this is made possible by the possession of another sense of which we know nothing. It is, however, opposed to general experience that living organisms of a higher type should possess a particular sense without the association of a material organ, but perhaps it is meant that this sense is without any material organ; if so, it only shows us how little our knowledge of the use of material organs helps us in accounting for incidents like those I have quoted. In the case of two of them I vouch for the truth, but they are only among hundreds equally well authenticated.

ABORIGINAL BOOK-KEEPING.

MR. James S. Brisbin, writing to the *New York Herald* from Fort Keogh, Montana, in March last, gives this curious example of the method of keeping accounts used by a semi-civilized North American Indian: "The other day" he says, "I was in the store when an Indian named Fire Wolf was settling his account. He had a little book, and in it the following account, kept by his own hand—



The explanation of this remarkable attempt at Indian book-keeping is as follows:—First, he bought a pair of shoes, for which he paid two dollars fifty cents, which is represented by the two upper large dots for dollars, the small dot half a dollar, the drawing of a shoe and the line connecting it with the dots. Then he bought a drawing knife, for which he paid one dollar fifty cents—the big dot and a little one. Then he bought a monkey wrench and a paper of sugar for one dollar fifty cents. Next he bought a knife and a piece of calico, for which he paid half a dollar each. The drawing lines and split dot represent this transaction. Then he bought a pair of stockings for half a dollar; next a small paper of coffee and a large paper of sugar, half a dollar each; then a big paper of crackers and a plug of tobacco. He had paid for all these articles except two dollars, which he owed, and he had come to settle his account. The debt is represented by the last two dots. His account agreed exactly with the book account in the store." This is perhaps not exactly an instance of aboriginal book-keeping, but it is curious as showing the effect on savage minds of contact with civilized methods, and may be instructively placed side by side with the efforts of the uneducated to make for themselves some system like that which they see their better-instructed neighbours to possess. Of this there is an amusing instance in a book published last year, from which the following description of Lancashire "badgers" is extracted: — "These small country shopkeepers or badgers were the general purveyors for the district, and were a hard-working plodding class, who supplied the labouring population with all the food they usually required from one pay-day until the next, upon credit; and some of their accounts were kept in a very unique fashion, each trust customer having a separate board of about six inches broad and varying from a foot to half a yard in length, on which was duly scored in white chalk the amount owing by such customer to the shopkeeper; such debt not being written in plain figures, but in a kind of cabalistic signs, which, if found a century hence, would be as strange and incomprehensible to future generations as Coptic hieroglyphics or the inscriptions on the Moabite stone are to the present. Pence were indicated by straight strokes thus: I, and halfpence by a horizontal line thus: —, and when the straight strokes amounted to half a dozen, they were rubbed out and half a circle substituted to represent sixpence; this was followed by straight strokes again until another half-dozen completed a shilling, when a round O was chalked on the board and all previous marks were effaced—these marks increased in number as the debt accumulated, until the O's amounted to ten in number, when a simple X, representing ten shillings, was duly chalked on the board, to be followed

by more O's and straight strokes until another ten shillings substituted a X for them, and XX on the board represented a debt of £1, and so on until pay-day reduced the score, or (as was very rarely the case) left a clean board with which to commence another week or fortnight's credit. The writer remembers an uncle of his coming over from Yorkshire where such a system of living upon credit was then unknown, and on this bad habit being explained to him, he expressed himself as follows:—'*Why, it seems to me that the folks hereabout have eaten a fortnight too fast.*' Herewith is shewn a copy of one of the shopkeeper's boards, representing a debt of £1. 17s. 9½d.:—

The writer has frequently been amused by witnessing the rapidity and dexterity with which one of these illiterate shopkeepers reckoned up a sum in addition on her knuckles, counting each knuckle as a penny, and the hollow betwixt as a halfpenny, when several articles had been purchased at one and the same time, the various prices of which having been thus summed up, the total amount was then chalked upon the purchaser's particular shop board, the ownership of which was recognised by the number of notches cut in the edge of the board, and the particular nail upon which it was hung! Such was the system of book-keeping amongst the illiterate tradespeople of half a century ago." (*Rural Congregationalism.* Manchester: Tubbs, Brook and Chrystal, page 70.)

Mr. CHARLES DARWIN ON INFANT DEVELOPMENT.

THE American Social Science Association is doing an exceedingly useful work in enlisting parents as observers of infant development.* The subject was introduced to the Saratoga meeting in a philosophical spirit by Dr. W. T. Harris, who rightly gave credit to Mrs. Emily Talbot, of Boston, for the happy thought of making fathers and mothers scientific observers of the development of their infant offspring. Alcott, Taine, Darwin and Preyer have already done something in this fascinating study, but a much larger body of data is desirable. Mr. Darwin has very concisely and suggestively put the matter in the following letter to Mrs. Talbot—

DOWN, BECKENHAM, KENT,
RAILWAY STATION, ORPINGTON, S. E. R.,
July 19.

DEAR MADAM: In response to your wish, I have much pleasure in expressing the interest which I feel in your proposed investigation on the mental and bodily development of infants. Very little is at present accurately known on this subject, and I believe that isolated observations will add but little to our knowledge; whereas tabulated results from a very large number of observations, systematically made, would probably throw much light on the sequence and period of development of the several faculties. This knowledge would probably give a foundation for some improvement in our education of young children, and would show us whether the same system ought to be followed in all cases.

I will venture to specify a few points of inquiry which, as it seems to me, possess some scientific interest. For instance, does the education of the parents influence the mental powers of their children at any age, either at a very early or somewhat more advanced stage? This could perhaps be learned by schoolmasters and mistresses if a large number of children were first classed according to

* Papers on Infant Development, published by the Education Department of the American Social Science Association. Edited by Mrs. Emily Talbot. Boston: Tolman & White, 8vo, pp. 52.

age and their mental attainments, and afterwards in accordance with the education of their parents, as far as this could be discovered. As observation is one of the earliest faculties developed in young children, and as this power would probably be exercised in an equal degree by the children of educated and uneducated persons, it seems not impossible that any transmitted effect from education could be displayed only at a somewhat advanced age. It would be desirable to test statistically, in a similar manner, the truth of the oft-repeated statement that colored children at first learn as quickly as white children, but that they afterwards fall off in progress. If it could be proved that education acts not only on the individual, but, by transmission, on the race, this would be a great encouragement to all working on this all-important subject. It is well known that children sometimes exhibit, at a very early age, strong special tastes, for which no cause can be assigned, although occasionally they may be accounted for by reversion to the taste or occupation of some progenitor, and it would be interesting to learn how far such early tastes are persistent and influence the future career of the individual. In some instances such tastes die away without apparently leaving any after effect, but it would be desirable to know how far this is commonly the case, as we should then know whether it were important to direct as far as this is possible the early tastes of our children. It may be more beneficial that a child should follow energetically some pursuit of however trifling a nature, and thus acquire perseverance, than that he should be turned from it because of no future advantage to him. I will mention one other small point of inquiry in relation to very young children, which may possibly prove important with respect to the origin of language; but it could be investigated only by persons possessing an accurate musical ear. Children, even before they can articulate, express some of their feelings and desires by noises uttered in different notes. For instance, they make an interrogative noise, and others of assent and dissent, in different tones; and it would, I think, be worth while to ascertain whether there is any uniformity in different children in the pitch of their voices under various frames of mind.

I fear that this letter can be of no use to you, but it will serve to show my sympathy and good wishes in your researches. I beg leave to remain, dear madam, yours faithfully, CHARLES DARWIN.

To Mrs. Emily Talbot.

The pamphlet before us, which we cordially commend for its interest and suggestiveness, contains also notes of observations taken fifty years ago by Mr. A. Bronson Alcott during the earliest years of his children, six examples of recent dates, a paper by Mr. Hippolyte Taine on the "Development of Language in a young child," Mr. Darwin's biographical sketch of an infant, and observations on a German child by Prof. William Preyer. The Council have issued an explanatory circular, from which we quote all the essential points:

The Education Department of the American Social Science Association, early in 1881, issued the accompanying Register, with an explanatory Circular. The same Department Committee would now call the attention of parents to the second issue of the Register of Observations on the development of infants, and beg their continued interest. In pursuing the study of this subject the Committee hope to attain several results:

1. True records of the order of development, and facts illustrating it.
2. More thoughtful attention, by both parents, to the idiosyncracies in dispositions, and to the needs of each child.
3. The discussion of unsettled questions, such as the inheritance of traits, the development of speech, intelligent consciousness, the influence of food, race, climate, etc.
4. Assistance to parents in the formation of more intelligent and systematic plans of education.

In reply to the query why these questions are asked, and certain others are not, it is proper to say that the form in which the Register is presented only suggests lines of study open to parents. It is hoped that sufficient curiosity and interest will be excited in the subject to tempt divergence from the method here presented. Each observer is therefore invited to broaden the field of observation by suggestions and by original research, and to report the results of investigation to this Committee.

REGISTER OF PHYSICAL AND MENTAL DEVELOPMENT OF

(Give the Baby's full name) .....
Name and occupation of the father?.....
Place and time of father's birth? .....
" " mother's " ? .....
" " baby's " ? ....
Is it a first, second or third child?.....
Baby's weight at birth? .....at 3 months? .....
at 6 months?.....at 1 year?.....
How fed?.....
Is the baby strong and healthy, or otherwise? .....
At what age did the baby exhibit consciousness, and in what manner? .....
At what age did the baby smile? .....
" " recognise its mother?.....
" " notice its hand? .....
" " follow a light with its eyes?.....
" " hold up its head? .....
" " sit alone on the floor? ...
" " creep? .....
" " stand by a chair? .....
" " stand alone? .....
" " walk alone?.....
" " hold a plaything when put in its hand?.....
" " reach out and take a plaything? .....
" " appear to be right or left handed? .....

At what age did the baby notice pain, as the prick of a pin? .....
" " show a like or dislike in taste? ....
" " appear sensible to sound?
" " notice the light of a window or turn towards it?
" " fear the heat from stove or grate? .....
" " speak, and what did it say? .....
How many words could it say at 1 year?.....
at 18 months? .....at 2 years? .....
(Please observe and report the order of the Parts of Speech.)
Are these observations made from memory? .....
from a diary? .....or from week to week? .....

In a letter received from Mrs. Talbot she suggests that observers should be asked to make weekly accounts of an infant's *pulse* and *weight*, especially when well born, of healthy stock, and living under good hygienic conditions. It is possible that the theories set forth in medical works on these physical signs are not based on a sufficiently careful observation of facts. It seems desirable that the attention of students of medicine should be particularly called to this subject with the view to an equipment in facts that will make them learned and skilful advisers in our families. It may be feared that if the whole truth were known, it would be found that the observations now relied upon were made in disease first, when the responsibilities and the possible issues are grave. To correct these we need the observations made by the students of the secrets of life in its happiest and healthiest phrases.

Professor Preyer has suggested that fathers should take up this matter, but without discouraging that view in the slightest degree, we may quote with approval the remark of a lady who has made some of the interesting observations recorded in this pamphlet: "Scientific observation of the baby ought to be the mother's compensation for the tedious routine of her daily duties."

The work is one in which many observers might easily take part, with pleasure to themselves and profit to science. The needs of the present are carefully ascertained facts.

THE BEGINNINGS OF MICROSCOPIC STUDY.

BY THOMAS BRITTAIN, F.R.M.S., PRESIDENT OF THE MANCHESTER MICROSCOPICAL SOCIETY.

IT must often be a subject of wonder that the necessity of the case did not result in the discovery of the telescope at least two thousand years before the days of Galileo. Had this been the case the discovery of the microscope must have followed as a natural sequel. The law of refraction, upon which both instruments are constructed, must have been often noticed in ancient days. Every drop of water and every bubble of glass told of the magnifying power they possessed. That this power was known and utilized, we have the best possible proof in the remains found in the ruins of the Royal Palace of Nimrod.

Recently glass bowls of rock-crystal have been found amongst the ruins, and there are conclusive indications that they were used as toy microscopes. Hollow bowls of glass were also manufactured, and we are justified in assuming that they were filled with water and also used for magnifying purposes.

These were the first microscopes, but of the first discoverer or discoverers history is absolutely silent, and no one can claim the honour, nor can we tell the age in which the discovery was made.

After many centuries we come upon the honoured name of Galileo (1564), who earned for himself immortality by his discovery and application of the telescope. Following close upon the discovery of the telescope, and doubtless a result of that event, we hear of compound microscopes in 1621. The name of Nicholas Fontana, of Naples, has been given as the original inventor, as also those of Jansen and Drebbel, two Dutchmen. Satisfactory evidence of the fact in all these cases is absent. There is somewhat better evidence in favour of one Zacharias Zanz, or his father Hanz Zanz of Middleburg, being the

first dealers in microscopes. They were spectacle makers, and probably hearing of Galileo's discovery of the telescope, by which the mountains of the moon could be seen, they would infer that the same law of refraction by which this was done could also, by means of smaller tubes and smaller lenses, be brought to magnify minute organisms in ditch water. So it was, and their reputation soon spread through scientific Europe. These microscopes consisted of the necessary tube, with reflector, and two simple lenses, the eye piece and object glass. These were the first compound microscopes, so called in contradistinction to the simple microscope of one lens held in the hand. Thus the plaything of the boys of Nineveh has become the most wonderful of all scientific instruments. Still retaining its power of giving pleasure, it now, in the hands of the student, unlocks the secrets of nature, and shows how organic life has been built up, and how the machinery of vitality is carried on.

About half a century after the discovery of the compound microscope we come upon the first instance of its application to scientific purposes in the person of Anthony Van Leuwenhoeck of Delft. Other workers may have existed at or before his day, but we have no record of them, and to him belongs the honour of being the first successful scientific worker with the newly-invented instrument. He was born in 1632, and in 1673, when about forty years of age, he sent his first scientific contribution to the Royal Society of London. He contributed papers to the "Philosophical Transactions," and they form remarkable proofs of his industry and perseverance in what must have been, with his instruments, a most difficult study. Besides these, he contributed others to the scientific literature of the day, in explanation of his discoveries. The microscopist of to-day, with his admirably perfect instruments and modern aids for investigation, looks backwards with astonishment at the work done by Leuwenhoeck with his imperfect machinery. There are indeed few things in scientific history more remarkable. The instrument in his hands was no longer a toy—with it he penetrated into the secrets of human life. He investigated the structures of blood and brain and other mysterious organisms connected with vitality, nor did he neglect other departments of scientific investigations.

Others may have previously been feeling their way in the dark or doubtful twilight, but Leuwenhoeck, before the full day brought facts which startled the scientific world, and gave an impetus to a new study, which has become a boon and a blessing to humanity, and at the same time a means of pleasing recreation to untold thousands. It has been supposed by some writers that Leuwenhoeck made all his discoveries with single lenses. This, however, appears to be an error, for at his death he left twenty-six microscopes to the Royal Society, and these are certainly compound, being composed of two lenses.

SOME QUERIES CONCERNING ANNELIDS.

BY ALEXANDER RAMSAY, F.G.S.

(Editor of *Scientific Roll.*)

1. Every annelid is by assumption considered to be distinguishable into three parts, viz., the cephalic, thoracic, and abdominal regions. The cephalic region comprises two parts, the cerebral ring and the buccal ring. The appendages on the cephalic ring are antennæ, those on the buccal ring tentacles. Would readers examine the species of annelids in their localities–marine, freshwater, and terrestrial—and report on the precise position of the mouth, and the character of the appendages on the ring in front of the mouth and on the ring bearing the mouth itself, and illustrate their remarks, if possible, by drawings?

2. The antennæ are supplied with nerves from the brain, and the tentacles with nerves

from the connectives. Are their functions different?

3. The respiratory organs of annelids are situated sometimes on the head, as in *Serpuleæ*; sometimes on the thoracic region, as in the *Terebellæ*; and sometimes in the abdominal region, as in the *Hermellæ*. What relation has the variable position of these organs to habits and habitats?

4. What is the chemical nature of the web so rapidly formed by many species of *Errantes?*

5. Some annelids have auditory organs, while others are without them. Do the former manifest keener powers of hearing than the latter?

6. Some annelids have eyes with crystalline lenses, others have eyes without crystalline lenses. Do the former always manifest keener powers of sight than the latter? Are the latter eyes which are in process of degradation or of development on the evolution hypothesis?

7. How is extension, flexion, and retractation effected in *Hermella*, which has no apparent muscles, and yet manifests movements similar to those seen in other annelids well provided with muscles?

8. What is the nature and function of the transparent globule expelled from the eggs of annelids after fecundation?

9. It is believed that annelids generally migrate seawards during cold weather. Would anyone send observations elucidating this point?

10. How do *Sabella saxicava* and *Polydora ciliata* excavate channels in limestone?

11. Why is the range of distribution of species of annelids more restricted than those of most other classes of animals?

12. The *Polyopthalmeæ* are remarkable amongst annelids for having a cephalic rotary organ of locomotion. What affinity or analogy has this organ to similar organs in other classes, such as those in the *Rotifera*, *Vorticellæ*, and young *Mollusca?*

NOTES ON SOME RARE BRITISH MOSSES.

BY JAMES CASH.

[*Read before the Manchester Cryptogamic Society, 15th May*, 1882.]

HYPNUM BLANDOVII.

THE discovery of this moss at Knutsford, its best known and now probably only habitat in this country, was made by the late Mr. Wm. Wilson, on the 17th November, 1831. Mr. Wilson was then unacquainted with the species, and, under the belief that he had stumbled upon fruiting *Hypnum abietinum*, a moss which is only found barren in Britain, he wrote in his diary under date November 17th: "Rode to Knutsford Moor. Saw abundance of *Hypnum abietinum* with setæ just shooting up." But having shortly afterwards discovered that this was an error he struck out the specific name and wrote "*laricinum MSS.*," supposing it to be a new species. He was not aware that the moss was identical with one previously found barren at Tunbridge by Mr. Josh. Woods, and which was described and figured, though imperfectly, in *English Botany*, edition i., as *H. Blandovii*.

At the time of Mr. Wilson's discovery, Smith's *English Flora*, vol. ii. (which is also the 2nd vol. of *Hooker's British Flora*), was passing through the press, and Mr. Wilson communicated his *H. laricinum, MSS.*, to the author of that work, and a brief description is given by Sir William Jackson Hooker at page 87. On the 12th December, 1831, as recorded in his diary, Mr. Wilson wrote and sent specimens of the new moss to Sir William (then Dr.) Hooker, together with sketches and remarks as compared with *H. abietinum*. Two days later he "examined and sketched more carefully the new hypnum," and on the 17th December he received from Sir William Hooker a letter in answer to his of the 12th. Sir William in that letter cites Swartz's characters

of *H. abietinum*, and says: "The figure of the leaf of your *H. laricinum* is very like that of the leaf of Swartz's plant, of which I have a sketch from Mr. Turner's specimens. . . . I think I might safely quote Swartz's *abietinum* under your *H. laricinum*."

On the 24th December Mr. Wilson again visited Knutsford in order to note the progress of the fructification of the new moss, when he found it "in the very same state as in November," and he adds the remark: "The fruit not to be had before March or April"—a fact of which he apprised Dr. Hooker in a subsequent communication. Under date 15th March, 1832, we find the following note in Mr. Wilson's writing: "Again attempted to gather *H. laricinum*. My brother accompanied me to Knutsford, and we saw it in *statu quo*;" and he observes in a foot-note: "The latter end of April is, in fact, the proper season for gathering it." On the occasion of this visit to Knutsford Mr. Wilson removed some of the moss "to be ripened in cultivation," and from that time he watched the development of the fruit with great attention. On the 16th April he again visited Knutsford, when he made a further notable discovery (to be referred to hereafter), but, as to *H. laricinum* it was in its natural habitat "still for the most part unswelled"—this remark, of course, referring to the capsule. "It is later than *H. cuspidatum*," he observes, "and less advanced than *H. stellatum*; but neither will be fit to gather till towards the end of this month," that is, April.

The new *Hypnum* continued to occupy much of Mr. Wilson's attention, and was the subject of correspondence with different botanists at the time. On the 19th April he sent other drawings to Dr. Hooker, and asked his opinion of *H. abietinum* in the Linnæan Herbarium, which, he says: "I believe to be *H. laricinum*;" and he considers a comparison with Drummond's American fertile *H. abietinum* very desirable, expressing, at the same time, a doubt if the true plant (*abietinum*) is ever found fertile in Europe.

On visiting Knutsford on the 27th of April Mr. Wilson found the capsules of *H. laricinum* very generally swelled to their full size, and in some few cases nearly ripe. The finest was "near the *Aspidium thelypteris*," where, as we all know, it is still, unless destroyed by the drainage now going on. But Mr. Wilson was destined to receive some unexpected light upon the subject of his discovery, and it came to him from Sir Wm. Jackson Hooker. Writing on the 2nd of May, 1832, Sir William congratulates Mr. Wilson on the discovery of *Paludella squarrosa*, and he says: "But if this charming plant is to be added to our muscological catalogue I fear another will have to be erased, for which you may blame me as much as you please. I find that *H. Blandovii* has a deep carina in the leaf, exactly as in *H. laricinum*, which I had before entirely overlooked; and I am now unable to perceive any distinguishing character. If you come to the same opinion you must still quote *H. laricinum* as being given in *British Flora*, vol. ii., pt. i., p. 87, and add, 'not of Hooker, *Mus. Exot.*, t. 35.'" Sir William had, long before its application to the Knutsford plant, appropriated this specific name for an Australasian moss. He goes on to say, in the letter from which we quote: "It is certain that those who have described *H. Blandovii* have not made sufficient use of their eyes; none of them having noticed the remarkable structure of the foliage. This it is which is the *abietinum* of Swartz"—thus confirming previous suspicions—"and probably some botanists have confounded it with *H. abietinum* too. Wahlenberg's *H. abietinum* (in Flo. Lappon. and Fl. Suec.) appears to be the true one; and he has a variety in Fl. Suec.—'*paludosum*' . . . under which he quotes *H. Blandovii* Web. and M. with a (?).—*H. abietinum* Funck, Deutsch. Moose, p. 59, t. 41, n. 25 is correct; so is Drummond in Musci Americani."

Mr. Wilson could not, of course, resist the evidence as to the identity of his Knutsford *H. laricinum* with the Tunbridge *H. Blandovii*,

and in writing of it afterwards he adopted the latter name. But, although not the first to discover the moss in Britain, he was, at least, the first to discover it in fruit; and, except at Knutsford, there are few if any localities now remaining in this country where it is found in that condition. The only other locality recorded in *Bryologia Britannica* is Terrington Carr, Yorkshire.

Mr. Wilson in 1832 endeavoured to transplant some fruiting *H. Blandovii* to a bog within a couple of miles or so of his own house, but with what success is not recorded. He planted on the 5th of May, 1832, "one patch in a low swampy spot" in a corner of Risley Moss, and the precise locality is indicated by its proximity to the Oak Wood. On the 16th February, 1878, the writer of these notes paid a visit to the locality referred to, to see if any trace could be found of *H. Blandovii*. But what was in 1832 "a low swampy spot," was 46 years later being prepared by the plough for what would doubtless prove a luxuriant crop of potatoes.

PALUDELLA SQUARROSA.

This moss was discovered by Mr. Wilson, at Knutsford, on the 16th April, 1832. He had been to Vale Royal, and crossed to Knutsford to observe the condition of the mosses previously found growing in the bog. This entry in Mr. Wilson's diary is the first mention made anywhere of *Paludella squarrosa* as a British moss: "Found a new bryum of the squarrose-leaved kind, very elegant, but barren." The next day Mr. Wilson examined the new moss, which he believed to be *Bryum squarrosum*, Hedw. (*Hypnum paludella*, Web. and Mohr, 274): he "found it to possess terminal perichetia, with abortive pistilla." He was correct as to the species.

On the 19th of April Mr. Wilson wrote to Dr. Hooker announcing the discovery of *Bryum squarrosum* and enclosing specimens and drawings. Letters conveying the same information were written to other botanists, among the rest to J. De C. Sowerby, Mr. W. H. Harvey—then a young and enthusiastic botanist, fast rising into note—and to Professor Henslow, of Cambridge University, not forgetting, either, one of the Lancashire artisan botanists, with whom he had frequent correspondence, John Martin, of Tyldesley. The moss, with others, was figured by Mr. Wilson for the 2nd edition of *English Botany*. There is no doubt that the original station for *Paludella squarrosa*, at Knutsford, has been destroyed by drainage.

It may be interesting to note that *Hypnum nitens* and *Mnium affine*, both fertile, were found at the same time and in the same locality. The fertile *H. nitens* grew "not far from *B. squarrosum*, nearer the brook, on the other side of the path," and there was another station for it "near the fertile *H. stellatum*, more towards the mere, and rather nearer the brook." These words are quoted from Mr. Wilssn's diary. They are too obscure to be of practical use now. Mr. Wilson appears to have searched the bog carefully for *B. squarrosum*, for he records on the 10th of May, 1832, that he was "unable to find any second station for it."

This, as far as is known, is all the information to be had about the occurrence of *Paludella squarrosa* at Knutsford. But, ten years later, certain muscologists in Yorkshire made diligent and successful search both for this moss and for *H. Blandovii*. An interesting letter from Mr. Henry Ibbotson to Mr. Wilson, dated Gauthorpe, near Whitwell, Mar. 1st, 1842, has been preserved, in which the writer says: "You have, I presume, received specimens of *H. nitens* and *H. Blandovii*, all the productions of a bog in this neighbourhood, from our respected friend Mr. Spruce, who informs me upon your authority that the same plants, together with *B. squarrosum*, grow in a bog in Cheshire, and that you suggested that our locality for the two former plants might also be likely to produce the latter. I have, therefore, been induced to examine the place very

carefully, and am pretty well convinced that the plant is not there to be met with. A short distance, however, from this bog there is another which I never visited previous to Thursday last, when I found it to produce the same plants as the first (with the exception of *H. Blandovii*) and, in addition, plenty of *B. squarrosum*, occupying the space of an acre at least. From the circumstance of your being the first discoverer of the plant in Britain, the intelligence of a new station being detected with a few specimens therefrom (which I now enclose) may be interesting. I am sorry that I have not been able to find it in a state of fructification; but I shall frequently have opportunities of visiting the place, and as this may not be the proper season I trust that I shall have the pleasure of finding it at some future time. . . . *H. nitens* will yield an abundant crop of fruit in this bog."

Of the present condition of the above-mentioned locality I am sorry not to possess any positive information. It is, however, understood to have been drained, and the rarities mentioned have been wholly or partially destroyed.

A BATCH OF QUERIES.

BY A FELLOW OF THE ROYAL SOCIETY.

I SEE you invite questions in your new periodical—now these are some scientific and otherwise that I should be glad to have answered :—

1. What is the price of electricity equal to a candle-light of the nominal value used in estimating gas? Can any one understand the various assertions?

2. Can any one tell me what is the value of wheat or maize when all the gluten is taken out of it?

3. Are there any biscuits made of starch without any gluten in it?

4. Has not a great chemist said that a child could be starved to death on arrowroot? Has not such a case happened in hospitals among well-meaning people? Will any one give us a test to distinguish mere starch from good food with the nitrogen in it?

5. Is it as wicked to sell starch for food, and to say that it contains all the elements of food, as it is to put water into milk?

6. Is there really something true in chiromancy? And is there something in reading character by handwriting?

7. I have heard that water can burn. Why do people not burn it?

8. When coals were dear, I was told that on the railways in Kent they burnt chalk. Why do they not burn chalk now?

9. There was an exhibition of methods for abating smoke. Were none of the plans of any use? If any were useful why not use them?

10. Does not gas give a great deal of smoke? Why do we not burn that smoke in our own rooms instead of complaining first of chimneys? Is it not well to begin at home?

11. Has not Dr. Siemens discovered perpetual motion in the sun and space? If so why should we not discover it on the earth?

AN IMPROVED METHOD OF CARTING IN THE SEVENTEENTH CENTURY.

BY A. C. E.

Henry Oldenburgh, writing to Lord Brereton, from London, Sept. 22nd, 1668, says :—"I saw yesternight a cart, laden with at least 600 bricks, whereof each by weight weighed above four pounds, drawn by one horse in an uneven and ascending way, by a new contrivance, which avoydeth rubbing much more than ordinary carts. It has been devised, as I mentioned formerly, by the concurrence of persons of several nations, and the patent of them is given in divers contry's; here, to the Duke of Monmouth and to Sir Ellis Leyton (as himself told me), and at Paris to some great persons; as also in Flanders. In the meantime our mathematical mechanicians does not want exceptions against the extraordinariness of the contrivance." What would this be? An improvement in springs, or a forerunner of the tramway?

THE COMING AND GOING OF THE SWALLOW.

BY A MANCHESTER PYTHAGOREAN.

NOW but little known English poetess has well expressed the general conditions under which the swallow arrives in England—

The gorse is yellow on the heath,
The banks with speedwell flowers are gay;
The oaks are budding, and beneath
The hawthorn soon will bear the wreath,
The silver wreath of May.

The welcome guest of settled Spring,
The swallow, too, is come at last;
Just at sunset, when thrushes sing,
I saw her dash with rapid wing,
And hail'd her as she past.

Come, summer visitant, attach
To my reed roof your nest of clay,
And let my ear your music catch,
Low twittering underneath the thatch,
At the gray dawn of day.

This year the "settled guest of Spring" has come earlier than usual, and instead of waiting for the "silver wreath of May," as Charlotte Smith evidently expects him to do, he made his appearance amidst the winds of March. The time of the swallow's arrival in this country has been variously estimated, but it is generally fixed as being about the tenth of April, although both earlier and later instances are on record.

Mr. Howell Howells, of Pontcarreg, Carmarthen, wrote to the newspapers to say that on Tuesday, March 21st, 1882, between ten and twelve o'clock, he noticed the spring swallows, six in number, and at two o'clock in the afternoon of the same day commenced the heaviest downfall of snow of the winter. This is an unusually early appearance, and it may therefore be interesting to note some of the dates recorded in spring and autumn of the appearance and disappearance of the swallows. The dates given are taken from the writings of Bewick, Gilbert White, Morris, the *Zoologist*, and writers in the *Times*, the *Manchester City News* of Nov., 1881, and other sources. Theophrastus tells us that the bird wind blew between 28th February and 12th March, and that at the latter date the swallows appeared at Athens. They are recorded by modern observers at Rome on the 3rd of March, at Bruges April 5th, and in Sweden about the 9th of May. The fact of the migration of the swallow was known in very ancient times, for Herodotus refers to them as wintering about the springs of the Nile. The swallow is generally expected in England about the 15th of April. They have been seen on—

April 1st, at Barnsley and Lewes.
,, 4th, at Eddystone.
,, 5th, at Barnsley.
,, 7th, at Butt of Lewes.
,, 8th, at Plymouth.
,, 8th, at Loch Ryan, Wigtonshire.
,, 11th, at Barnsley.
,, 12th, at Northenden.
,, 14th, at Loch Ryan, Wigtonshire.
,, 15th, at Crumpsall.
,, 17th, at Barnsley.
,, 17th, at Hunstanton.
,, 17th, at Douglas Head.
,, 19th, at Hunstanton.
,, 19th, at Ballina, Ireland.
,, 24th, at Rhinns of Islay.
,, 30th, at Isle of May.
May 4th, at East Goodwin.
,, 9th, at Teesmouth.
,, 10th, at Skerryvore.
,, 11th, at Point of Ayr.
,, 12th, at ,, ,,
,, 13th, at ,, ,,
,, 15th, at Larne.
,, 16th, at Sumburgh Head.
,, 19th, at ,, ,,
,, 22nd, at Corton.
,, 22nd, at Teesmouth.
,, 24th, at Isle of Morchan.
,, 25th, at Corton.
,, 26th, at Kentish Knock.
,, 29th, at Sumburgh Head.
,, 31st, at Auskerry.
June 2nd, at ,,
,, 9th, at Leman and Ower.
,, 14th, at Isle of Morchan.
,, 21st, at Leman and Ower.
,, 22nd, at Monach Island.
,, 23rd, at Cockle.
,, 23rd, at ,,

Birds, supposed to be spring emigrants, have been noticed as late as July 6th at Southsand Head. The ancients looked upon the swallow as the messenger of spring, but they knew that like other heralds his announcements were not always to be implicitly trusted. Hence arose the proverb, "One swallow does not make a summer," a saying current alike in Greece, Italy, France, Germany, Holland, Sweden, Spain, and, doubtless, other countries. There are some cases on record in which the birds have appeared early, whilst the weather was inclement, and others in which they have been later than usual in spite of the warmth of the spring time. Probably something is due to the favouring gales which in certain years will accelerate their flight. In this connection it is noteworthy that an ancient name for the spring winds was the chelidonian winds, because they brought with them swallows.

When the summer birds have arrived on the south and south-east coasts they proceed to distribute themselves over the country, and as there is a difference of about ten days between their appearance in south and north, it may be considered that their inland distribution is effected at the rate of about thirty miles per day. Frequently the same birds return year after year to the old meeting ground. I have already quoted one poetess, and am tempted to contrast the objective tone of Charlotte Smith's verse with the subjective manner in which the same topic is treated by Miss Emily Hickey.*

ONE SWALLOW.

We are very glad to-day and lift our praises,
For, with eyes that lookt out long and anxiously,
While the cutting wind blew sharp against our faces,
This one swallow did we see.

O thou blessed swallow, matter not thou reach us,
Travel faint and tir'd, with draggled plumage wet;
Through the winter—awe thou comest now to teach us
Of a spring we know not yet.

Yes, to-day has set us free from that oppressive
Going softly we had kept so very long,
And we loose the strain of new-born joy excessive
For a rain of tears and song.

But, "*one swallow does not make a summer*," say ye,
"Earth in dreary twilight lieth veil'd as yet;
Many a weary wind must blow its blast ere may ye
Seek the nascent violet.

Would you quench with that drear adage joy that quickens
In a triumph through our whole lives once again;
Till the spirit, shorn of comfort, quails and sickens
For your biting frost and rain?

Nay, ye cannot take our holy joyaunce from us;
Nay, ye cannot make the anointed eyesight dim,
Of the trustful eyes that waited God's good promise
Which they had received of Him.

Ye have only seen to-day one swallow flying
From the sunny southern land where summer is;
But we know they come in flights with that undying
Summer greater far than this.

O the beauty and the joy that passeth telling!
O the time of singing birds that soon shall come,
When the trees put forth their leaves of fairest smelling,
And the brooks no more are dumb!

Oh, we take the blessed guerdon none receiveth,
Save whose soul 'gainst doubting's bitter breath can prove
That sweet grace which all things hopeth and believeth,
Not credulity, but love.

* A Sculptor and other poems, by Emily H. Hickey. London, 1881.

The time of the swallow's departure is supposed to be early in October. Some change their quarters in August, others in the middle of September. A pair of swallows caught in a heavy snow-storm 18th November, 1880, took refuge on the ledge of a kitchen window at Freshwater, Isle of Wight. They were young birds and flew away very languidly. On the same day some were seen at Hunstanton, Norfolk. (*Natural History Journal*, December, 1880, p. 162.)

Sometimes after the swallows affecting a particular locality have departed a few fresh ones will make their appearance. These late swallows have been noticed in October, November, and December. Mr. Richard Brooke notices that he had seen the swift, which usually leaves about the 12th or 13th August, as late as the end of August or beginning of September, at Wilmslow. The chimney swallows leave about the end of September, but

were seen by the same observer on the 20th October. On the 26th of September, 1832, he noticed that the swallows had apparently left the neighbourhood of Liverpool, but on the 7th October, when the fall of the mercury announced a coming storm, great numbers of swallows were visible. A great storm followed, and it became evident that the swallows had really started on their homeward flight, but had put back to avoid the impending tempest which they must have foreseen on the ocean. They remained in the district until the 15th and 20th of October. This is a confirmation of Mr. Jesse's idea that the swallows are exceedingly good weather prophets.

The following are the dates either of the disappearance of the swallows from the localities named, or the day when they were observed outward bound. August 15th, at Coquet Island; 21, at Auskerry; Sept. 9, 10, 11, at North Foreland; 13 at Moston; 16, at Hunstanton; 18, at Huyton, Yisks; 26, at Liverpool; 28, at South-sand Head, 29, Barnsley, 30, in Berwickshire; August 31, at Caldy; September 15, at Nash; 24, at Morecambe Bay; 25, at Carnarvon Bay; 28, at S. Bishop.

The middle of October is often cited as their general time of departure. They have been noted on the 4th of that month at Whitley; 7, at Crumpsall; 12, at Godresy and Helwich; 17, at Huyton and Stretford; 20, at Wilmslow; 22, at Winscombe and Totnes; 23, at Plymouth and Torquay; 24, at Winscombe; 25, at Huyton and at Northenden; 27, at Market Bosworth and at Weston-super-Mare; and on the 29, at Totnes. They have been seen on the end of November at Totnes; 5, at Selborne; 6, at Winscombe; 9, at Manchester; 11, at Caldy; 15, at Brighton; 18, at Temple Balsall, Freshwater and Hunstanton; and on the 30th at Penzance. They have been recorded on December 3 at Redcar; 9, at Norwich (this was a young bird and fell down a chimney); and 10, at Goole. Moreover one was observed on the Jannary 18, 1837. This would be some casual laggard excepted from the general Autumn flight. They congregate in great swarms, as though afraid to make the final venture. Thus the number of them to be seen toward September in the South-eastern parts, and especially on the coasts of England, is a matter of astonishment. Their actual departure, however, is rarely noticed, and it is therefore supposed that they take their flight in the dark, or in the early morning, before the world of humanity is on the alert.

Mr. William Black, in the *Times* of 19th November, 1881, says that his observations at Brighton and the testimony of the Newhaven fishermen lead him to suppose that the big flight of swallows and martins took place about three weeks before that date—say about October 27th—whilst smaller bands had been visible, culminating in a second flight on the 13th November. Even on the 15th some of them were seen plainly skimming about the Greenway Coast-guard Station.

The swallows have been noticed in seaward flight. They "scout and hurry along in little detached parties of six or seven in a company, and sweeping low, just over the surface of the land and water, direct their course to the opposite continent at the narrowest passage they can find." Some swallows, quite exhausted, flew on board a ship between Cerigo and Malta, 21st April, 1860. Hence these birds must have ventured on a flight of 480 miles. There are various similar observations. The frequent storms, and it may be the fatigue of the journey, must be fatal to many birds. Humboldt says that he saw a swallow on the rigging when at sea, 120 miles from land. The old notions as to the torpidity of the swallow during the winter are now generally abandoned. Jenner, in order to satisfy himself of the migration of birds, procured a dozen swifts, and by taking off two claws, marked them in a manner that ensured easy recognition. The year following, when the nesting places were searched, several of the

marked birds were found. They were also noticed in the second and third year. After that the systematic examination ceased, but seven years later a cat brought one of the mutilated birds into the farm-house.

The problem of the migration of birds has no satisfactory solution. We know the facts—at least in a certain measure—but much of the impulse remains a mystery. The phenomena may be concisely stated. The birds which winter in this latitude do not breed here, and hence we may conclude that those which came to us in the spring from the sunny south do not breed there. The swallows, when the sexual instinct is awaking, hasten northwards, and the pair build their nests and bring up their young. Then when there is a prospect of falling food supply and colder weather, they fly away with their young ones to warmer regions. There are two great migratory waves of bird life northwards in spring, southward in autumn. The spring flight is determined by the paternal instinct which sends the birds to the place of their own birth, there to rear a progeny and establish a home; the autumn flight is apparently occasioned by a prophetic foreboding of the hard weather and scanty fare of the English winter. The locomotive power of birds has influenced their geographical distribution in a marked degree. "Both summer and winter birds of passage" says Dr. Collingwood "are constitutionally too delicate to flourish or even live as a rule, if permanently restricted to these northern summer quarters, but their power of changing them under the influence of the migratory instinct increases their own sphere of enjoyment, and affords the inhabitants of these and other more northerly climes the pleasures and benefits arising from their presence amongst us."

Dr. Collingwood has suggested, though in a very cautious fashion, that the length of time a summer bird stays with us is in inverse ratio to the distance of his winter domicile. The chiffchaff remains here nearly half the year, and probably winters at a comparatively short distance south of the island, whilst the swift is here only for about three months, and probably has its brumal retreat much nearer the equator. This observation is confirmed by the similar testimony of Audubon.

The paternal instinct is strong in the swallow, yet it is less powerful than the migratory impulse. When the southward craving comes upon the old birds, they will even abandon their young in their nests to perish of cold and hunger. For a time the young birds may manage to obtain a scanty living, but the advancing cold destroys the insects on which they feed. It is possible that casual discoveries of such starving birds may have given rise to the fables as to swallows remaining torpid during the winter. In the spring of 1821 Mr. John Blackwall saw a pair of house martins take possession of the nest they had built in the previous summer. In order to re-enter they had to draw out the dried bodies of three nearly full-fledged nestlings whom they had abandoned. Another couple, after some unavailing attempts to drag forth the dead bodies of their abandoned offspring, covered the opening of the nest with clay. The home of the unfortunate youngsters thus became their tomb. In 1825 Mr Blackwall had fourteen martins' nests examined, and five of them contained dead nestlings, whilst in another there were two eggs which had evidently been abandoned just before hatching. We also find that the sand martin sometimes abandons its young. The same acute observer amongst other birds took swallows and house martins from the eggs on which they were sitting, and then replaced them when the birds, apparently unconscious of danger, resumed their maternal task. A swallow was killed near Manchester on the 9th of November, 1880. Mr. T. Lister, of Barnsley, to whom it was sent, says that it was a young bird, and had probably been hatched too late to join the main body in their flight.* Doubtless it had

* *Natural History Journal*, December, 1880, p. 163.

been abandoned by its parents. The 26th September, 1851, was a very cold and stormy day, and no less than ninety-two swallows, chiefly young birds, were picked up almost dead with cold and hunger. In 1826 Mr. Blackwall examined twenty-two martins' nests in a barn at Hill Top, Blackley. Thirteen contained eggs or dead nestlings.

There is even a suspicion that at other seasons they are sometimes guilty of infanticide. The philosopher Kant, when walking in a wood near the wall of a ruin, heard the swallows high up on the wall in shrill debate. Presently there came a pause, then a long low plaintive note from one of them, and immediately thereafter a nestling, not yet able to fly, fell to the ground. Kant concluded that the debate was that of a council which decreed that there was not nest-room or food enough for all the little ones; one must be sacrificed, and the one low plaintive note was that of the mother submitting to the fatal conclusion.*

These observations, so far made, whilst they show the strength of the migratory instinct, do not throw much light upon its causes. This mystery has been most poetically expressed in one of those delicately wrought lyrics with which Mr. E. W. Gosse from time to time favours the lovers of poetry :—

THE RETURN OF THE SWALLOWS.

"Out in the meadows the young grass springs
  Shivering with sap," said the larks, "and we
Shoot into air with our strong young wings
  Spirally up over level and lea;
Come, O swallows, and fly with us
Now that horizons are luminous!
  Evening and morning the world of light,
  Spreading and kindling, is infinite!"

Far away, by the sea in the south,
  The hills of olive and slopes of fern
Whiten and glow in the sun's long drouth,
  Under the heavens that beam and burn;
And all the swallows were gathered there
Flitting about in the fragrant air,
  And heard no sound from the larks, but flew
  Flashing under the blinding blue.

Out of the depths of their soft rich throats
  Languidly fluted the thrushes, and said,
"Musical thought in the mild air floats,
  Spring is coming and winter is dead!
Come, O swallows, and stir the air,
For the buds are all bursting unaware,
  And the drooping eaves and the elm-trees long
  To hear the sound of your low sweet song."

Over the roofs of the white Algiers,
  Flashingly shadowing the bright bazaar,
Flitted the swallows, and not one hears
  The call of the thrushes from far, from far;
Sighed the thrushes; then all at once
Broke out singing the old sweet tones,
  Singing the bridal of sap and shoot,
  The trees' slow life between root and fruit.

And just when the dingles of April flowers
  Shine with the earliest daffodils,
When, before sunrise, the cold clear hours
  Gleam with the promise that noon fulfils,—
Deep in the leafage the cuckoo cried,
Perched on a spray by a rivulet side,
  "Swallows, O swallows, come back again
  To swoop and herald the April rain."

And something awoke in the slumbering heart
  Of the alien birds in their African air,
And they paused, and alighted, and twittered apart,
  And met in the broad, white, dreamy square,
And the sad slave-woman, who lifted up
From the fountain her broad-lipped earthen cup,
  Said to herself with a weary sigh,
  "To-morrow the swallows will northward fly!"

* Thomas Carlyle, by M. D. Conway. London, 1881, p. 83.

The Historian's Garden.

The venerable historian of the United States, Mr. George Bancroft, has a famous rose-garden at Newport which is as great a pride to the scholar as his histories themselves. Flowers grow at Newport in the very spray of the sea, and their success is due to two things, the humidity of its atmosphere and the skill of its florists. It was on Mr. Fairman Rogers' place, a year ago, that the gardener faithfully copied an Oriental rug and spread it upon the lawn. It was a marvel, this great floral "prayer rug," with its artistic, subdued, yet rich coloring of the East. Its hues harmonized to a perfection that was almost incredible, when one reflected that it was made up of thousands of growing plants; and all summer long it was carefully kept in this state of perfection. Looking down from a height of an upper window, the deception was complete, so closely did it imitate a Turkish carpet. On another lawn there grew a quotation from Shakespeare, every letter as perfectly outlined as the best draughtsman might do it with pencil or brush.

THE TOPOGRAPHICAL DISTRIBUTION OF THE NIGHTINGALE IN GREAT BRITAIN.

BY ERNEST C. A. AXON.

THERE is a proverb "no nightingale north of the Trent;" but like many other popular sayings it is not accurate, for the bird is well known in various parts of Yorkshire, and has even been heard as far north as Midlothian. Mr. James Arlosh, in the Transactions of the Cumberland Association for the advancement of Literature and Science (Part V. p. 131) has the following note:—"I have been told that nightingales are heard every spring at Prestwich Clough, near Manchester." This is a mistake, as even the most regular visitor to that pleasant valley is not likely to be delighted with the song of this famous bird. The only time that the nightingale can with certainty be said to have been heard near Manchester was "about twenty years ago," when it made its appearance before an enthusiastic audience at Wilmslow. On this point we have the distinct testimony of two competent observers, Mr. John Plant, F.G.S., and Mr John Page. The latter has given great attention to the subject, and in a letter to the *Manchester Guardian* (Jan. 24th, 1882) says—"Scarcely a spring has passed by for the last forty years that some one has not written to the local newspapers announcing that the song of the nightingale was to be heard within a few miles of this city. When these announcements have appeared I have almost invariably visited the spot—on several occasions by desire of the late Mr. John Harland—for the purpose of ascertaining the truth or fallacy of the statement, and in every instance save one, if a bird has been heard singing at all, it was not the nightingale. The gay deceiver has been the sedge warbler, which is a nocturnal songster, being at its best in June, when new hay is scenting the atmosphere. The exception I have referred to occurred over twenty years ago. The newspapers having stated that a nightingale was nightly to be heard at Wilmslow, I proceeded by a late train to that rural parish, and was somewhat astonished to find an assembly of several hundred persons in a field on the southerly bank of the Bollin, patiently waiting for the notes of the feathered vocalist. The sloping ground on the opposite bank was well covered by trees and underwood, and appeared a likely place enough for the nightingale to choose for nidification. After waiting for about an hour the godlike portion of the audience began to display symptoms of impatience, and showed that their sources of amusement—not to say civilization—were not exhausted, by flinging an odd sod or two, which seemed to alight without partiality. Fortunately, however. the exquisite notes of the bird—the real Simon Pure—suddenly came floating across the rippling stream; the audience were spellbound, and hundreds heard Philomel's voice for the first time. The bird continued to have a numerous and appreciative audience for a few succeeding nights, I believe, when it was shot by, it was stated, command of the owner or manager of the estate."

Below is given an alphabetical list of the counties and also the particular localities where the nightingale has been heard.

ENGLAND Counties.	Localities.	Authority.
Bedfordshire.....	Woburn Abbey ...	Morris .....
Cambridgeshire..	Cambridge	Z. 1869 .....
Cheshire	Wilmslow.....	see above....
Cumberland.....	Carlisle..... ...	Morris.....
Derbyshire	Doveridge	Morris .....
Derbyshire	Melbourne	Z. VII. .....
Devonshire	Barnstaple	Morris .....
	Exeter	Morris .....
	Exmouth	Morris .....
	Kingsbridge.....	Morris .....
	Tallaton, near Honiton	Z. IV. .....
Dorsetshire.....		
It is well known in this county		Morris .....
Essex	Colchester	Z. 1866 .....
Gloucestershire...		
Well known in some parts.....		Morris .....
Hampshire '.....		Morris .....
Well known ...		

Hampshire	Isle of Wight ...	Z. 1866-67...
Kent	Rainham.....	Z. 1866 .....
,, ...	Tunbridge	Z. XV .....
Lincolnshire	North East.....	Z. 2 Ser. VI
,, ...	Bradley Woods...	Z. 2 Ser. V
Middlesex	London	Z. 1879 .....
Monmouthshire ..	Tintern Abbey...	Z. IV .....
Norfolk	Norwich.....	Z. 1868 .....
Northamptonshire	Oundle, Rockingham Forest ...	Z. XIV .....
Nottinghamshire	Nottingham	Midland Naturalist vol. III
Oxfordshire Known all over the county ...		Z. VII.....
Shropshire	Oswestry	London vol. V
Somerset		Morris.....
Well known ...		
Staffordshire Bred in this county in 1877	Bowsey Wood ... Wrinehall Wood	North Staff. Rep., 1879
,, ,,	Weston-un-Lizard	Garner .....
Suffolk	Beccles	Z. 2. Ser. IX
,, ...	BurySt Edmunds	Loudon, vol. V
,, ...	Stowmarket.....	Z. VII .....
,, ...	Woolpit	Z. 1866 .....
Surrey	Godalming	Rusticus.....
,, ...	Guildford	Z. 1868 .....
,, ...	Tootney.....	Loudon v. IX
Sussex.		Morris.....
Well known ...		
Worcester	Malvern	Z. 2. Ser. VI
Yorkshire.....	Baldersby	Clarke & Roebuck .....
	Bagby	,, ,,
	Barnsley	Morris..... ..
	Beverley	Morris .....
	Bradford	Morris .....
	Bridlington	Clarke & Roebuck.....
	Brough	,, ,,
	Bishop'swood, nr. Cawood	Morris.....
	Doncaster	Clarke & Roebuck .....
	Flamboro' Head	,, ,,
	Huddersfield ...	Morris .....
	Leeds	Morris.....
	Otley	Clarke & Roebuck .....
	Patrington	,, ,,
	Ripon..... ..	,, ,,
	Selby	,, ,,
	Sessay	,, ,,
	Sheffield.....	Morris .....
	Shipley	Morris .....
	Skelton (5 miles N. of York) ...	Morris.....
	Thirsk	Clarke & Roebuck .....
	Wakefield	,, ,,
SCOTLAND Edinburghshire.	CalderWood, 1826	Macgillivray
,,	Edinburgh, 1839	,,

The nightingale is apparently unknown in Ireland, as no localities have been recorded for that island.

The authorities for the above statements are—

Clarke and Roebuck's Handbook to the Vertebrate Fauna of Yorkshire, 1881.

Garner (R.) Natural History of Staffordshire, London, 1844.

Loudon's Magazine of Natural History, 1829-40.

Macgillivray (W.) British Birds, 1837-52

Morris (Rev. F. O.) British birds, 1870.

North Staffordshire Field Naturalists' Report, 1879.

Newman (E.) Letters of Rusticus on the Natural History of Godalming, London, 1849.

Zoologist, 1843-81.

THE PLEASURES OF RURAL OBSERVATION.

BY CUTHBERT OXENDALE.

Oh ! how canst thou renounce the boundless store
Of charms, which Nature to her votary yields ?

IT too frequently happens that those who spend their lives amongst the most delightful scenes of nature see in them no beauty. The utilitarian spirit often clouds the eye of beauty, but still oftener the powers of observation being left neglected and undeveloped, deprive bucolic life of its greatest charms. This was my own experience for many years until I stumbled upon an article upon the education of the eye, in an old volume which had found a place in the very limited library of our farm-house parlour. To that accident I owe many of the happiest hours of my life. It taught me to find a life of beauty in the clouds, which eclipsed my most fanciful dreams, and often I have stood for hours watching the changing masses of vapour turned to fleecy mountains by the vernal sun or circular moon, sometimes painted by old Sol, with rose and saffron, and delightfully rolled and doubled up, and mixed by the busy artful winds in the great azure basin, or forged into long-drawn belts of alternating cloud and sky, producing effects quite unapproachable by brush, and sometimes

the sun has mixed all his brilliancies in a perfectly drawn arc, upon the leaden-hued rain-cloud; or what is more rare, but scarcely less beautiful, the moon has built a bridge of silver upon the lines laid down by the sun. If ever in my days there are missionaries sent to those benighted and unhappy heathen people who have never tasted the precious influence taught by "cloudology," I shall rush for an appointment, and my ambition would never be gratified until I am an arch-priest of the order. In the outlines of trees the symmetry and proportion of their trunks and branches, and the harmony of colour between leaf and bloom, awakened sensations within me to which I had been a stranger. I could not slash down a branch of hawthorn in bloom out of mere wantonness any longer, and I shrank from treading upon a daisy when I could avoid it. Winter as well as summer presented fresh charms. I remember still the rapture I experienced in following the course of an ice-bound brook, admiring the frost-piled boulders, the reaches of shot-ice, the hopping of the water, huge drops chasing each other in their course from one fantastic ice-block to another, like agile squirrels leaping from tree to tree, and the conical icicle pillars were all new wonders. The hoar frost, the fresh-fallen snow, which had stolen softly down in the breathless night, lest it should awake the winds that slumbered in their caves, was a new revelation of beauty. I had no poetic inspiration, no enviable degree of fancy, and all these new treasures which at fifty are more precious than ever, were the result of acting on the advice of that article which inculcated the education of the eye. I had felt a want of something, so I educated myself in this charming art of observation. But it was not until I had quitted my rural home and had been engaged in urban pursuits for sometime, that by bit and bit I dropped upon allusions to botanic curiosities, and heard men extol botanic science, that I discovered that I knew scores of plants by sight, and was acquainted with their favourite *habitats*. I was amazed at the interest which was excited in my new associates' minds by plants which were as familiar to me as the nails on my own fingers. I had never dreamt that what I had often destroyed without the least compunction, and counted as noxious good-for-nothing weeds—a part of our first parents' curse, as I thought—were objects of study and admiration of some of the most eminent men and women in the world. It is true we gathered centuary and betony, agrimony, tormentil, and mountain flax, and a few other herbs, and dried them for use as medicine. It was enough that they were "reckoned good for" this, that or the other ailment, and once a doctor who paid us occasional friendly visits collected some "Caton ladies," *to study*, he said, which created some wonder, and I fear some amusement too.

> A primrose by the river's brim
> A yellow primrose was to *me*
> And it was nothing more,

except occasionally to eat the petals or change their colour as they grew by the application of dung to the roots. In this way we used to astonish town-bred people, who had never seen a coloured primrose before. While "louking" corn in spring or using the mattock, and often as we pushed the sickle into the standing grain, we encountered strange plants, whose brilliant flowers or seed would, for a moment perchance arrest one's attention. The sow thistle's milk, or the milk of the dandelion, we might use to paint our hands with sometimes, and the seed of the latter we might blow as clocks, every puff which it took to disperse the seeds being reckoned an hour. Or we might while away a little time by taking the stems of rib-grass and fight a friendly duel with them, the heads of the plant, not our own, being the sufferers. In harvest, we might, when walking from one end of the field to the other, take our sickles and cut a pipe in a stem of grain—*Sylvestrem tenui Musam meditaris avena* — and amuse

ourselves. The "kewse," the "dogtree," and the sappy, fine branches of the sycamore, all contributed to our amusement. A nut-shell carved out, with a stick, a string, and a potatoe, furnished material for a toy, while the daffodil made a dye for our Easter eggs, and a bunch of "neps" served as scent for our clothes; but we saw nothing of that beauty, wonder and worth in them, taught by botany, although for a great part of the year we resided in a botanic paradise, if we had only known it, the richness of which would have afforded food for our minds, instead of dealing in anecdotes and stories, not destitute of humour and wit, as some, for want of knowledge and sympathy with rural life would suppose, but not so select in tone always, as the fashion of the present age demands. We were not destitute of some knowledge of the many peculiarities of plant life, but we had nothing to guide us to study them, and no inducement. We should have regarded as harmless lunatics the captors and classifiers of butterflies, "stangin ezarts" and grasshoppers. On my first visit to a museum it was an astonishment to find that fancy snails, grubs and caterpillars were things for people educated and rich to care about, instead of their discovering some means to destroy them. Even an "earwig," that one had such a horror of creeping into one's ear, if it should catch a body asleep, and kill them stark dead; "thunner clocks" and big beetles that used to rise from under a patch of dried dung, and for want of better steering skill used to buz into one's eye. These, then, were town-people's wonders. It took me some years to unlearn my foolish and ignorant contempt for these studies, and then it was replaced by a keen regret that neither at school nor elsewhere had I met with tha kindly direction that would have given a right and useful direction to my early tastes.

The Swallow-Stone.

What is "the stone in the nest of the Swallow," to which Longfellow alludes?—X.

ANECDOTE OF THE LATE CHARLES DARWIN.

BY REV. E. M. GELDART, M.A.

AS an instance at once of the modesty and penetration of this greatest of English naturalists, now alas no more, I may relate the following anecdote, for the truth of which I can vouch:—Some boys found first a *Dytiscus*, and afterwards some frogs, with small fresh water mussels clinging to their hind legs. Puzzled by the phenomenon they made bold to write to Mr. Darwin asking him if he could throw any light upon the subject. In return they received a very kind answer thanking them for the very great light which they had thrown on a problem which had long puzzled him, viz.:—How it came about that mussels which can neither fly nor walk can migrate from one pond to another. Let this be an encouragement to all young naturalists, not only to observe but to record their observations.

THE CENTRE FOR COLOUR PERCEPTION.

THE *Opthalmic Review* of May contains several important articles. We quote from it the following abstract of J. Samelsohn's (Cologne) recent researches:—That the perception of colours is dependent on a centre distinct from those assigned to the perception of space and of light was suggested by the observation of some cases of congenital and acquired colour-blindness. By a detailed history of a most interesting example of hemi-achromatopia in which the perception of light and space was normal, but that of colour entirely lost in the left halves of the field of vision, Samelsohn gives a strong support to this presumption.

A man, 63 years old, sustained impairment of vision dating from an attack of apoplexy accompanied with right hemiplegia nine months previously; at the end of this period motion was partly restored and sensibility entirely. The examination of the eyes did not show anything abnormal hypermetropia 1.25 D., vision about ½, but in normal

conformity with the age and optic media of the patient. The right superior rectus was slightly paralysed; the field of vision normal in extent, as tested with squares of white paper of various sizes. But as soon as coloured paper was used, complete colour-blindness of the left half of both fields was strikingly manifest. In this left half which was sharply vertically demarcated from the right half, every colour was perceived, but only as a more or less saturated grey, whilst in the right halves the colours appeared normal. Under treatment the paresis of the right superior rectus vanished, but the hemiachromatopia persisted. The patient died about four years later from a new apoplexy.

Samelsohn could not obtain a *postmortem* in this very interesting case, and therefore no anatomical evidence could be added. However, from cases described by Treitel and by Landolt, his opinion meets with strong support.

ON THE GROWTH OF THE GIRAFFE.

BY M. SAINT-YVES MENARD.

(*Sous-Directeur du jardin Zoologique d'Acclimatation; Professeur de Zootechnie à l'école Centrale des Arts et Manufactures.*)

SOME interesting observations have been made at the Paris Jardin d'Acclimatation since 1874 on the growth of the giraffe. The results may be thus stated:—1. Giraffes grow at least to their ninth or tenth year; 2, the males become taller than the females; 3, in animals of the same sex the growth varies but little in individuals; 4, growth decreases in activity in proportion to the distance of time from birth, and is less active in cold than in hot weather, notwithstanding efforts to guard the animals from the evil results of winter weather and to place them under conditions of marked regularity of temperament; 5, at birth these animals have 45 per cent. of the size to which they ultimately attain; 6, gestation and suckling do not appear to retard the growth of the females.

These results are not merely curious from a scientific point of view. From their precision and exactitude some important deductions may be drawn, and it is probable would apply to many species, perhaps, indeed, to all. Since animals develope so much more rapidly in their youngest state, it is during that period above all others that efforts should be made to give them a complete and healthy development. Since cold weather has so marked an influence upon them it is wise to endeavour to counteract it by feeding them very well.

THE COMET.

THE comet of 1882 was first seen from Albany, America, on March 18th, by Mr. Charles S. Wells. It is rapidly approaching the sun and the earth, and is now within the orbit of Venus, and, consequently, nearer the sun than the earth is. Its apparent path in the heavens is nearly a straight line, and will continue to be so until it reaches its nearest point to the sun on June 10th, when it will be about a twentieth of the earth's distance. In passing the sun it will disappear from view for two or three weeks, after which it will follow a course near the celestial equator so long as it remains visible, which will probably be till the close of September. At the present time (June 1st) the brightness is about seventy times that of its first appearance.

The following are the positions of the comet for the first eight days of June, computed from Berlin at midnight:—

	Right Ascension.			Declin. North.	
	h.	m.	s.	°	′
June 1.—	4	22	53	43	15
,, 2.—	4	26	53	45	19
,, 3.—	4	30	40	47	28
,, 4.—	4	34	13	49	41
,, 5.—	4	37	36	52	2
,, 6.—	4	41	0	54	33
,, 7.—	4	44	36	57	16
,, 8.—	4	48	46	60	20

The brightness on June 3rd will be 112 times greater than that of March 19th, and on June 7th 351 times greater; on the 11th it will be 1,564 times greater.

MICRO-FUNGI.*

MR. THOMAS BRITTAIN has had the happy thought of compiling an A B C of microscopic fungi. He has arranged his pleasant gossip and useful hints in the form of a companion to the months, so that he has given the student materials for thinking and research "all the year round." The author writes not only with full knowledge, but with most painstaking endeavour to smooth the path of the young beginner. At the end is a lengthy appendix, containing a long list of the micro-fungi to be found on leaves of plants. The book is illustrated by two engravings, one of which we reproduce, and which is thus described—

PLATE I.

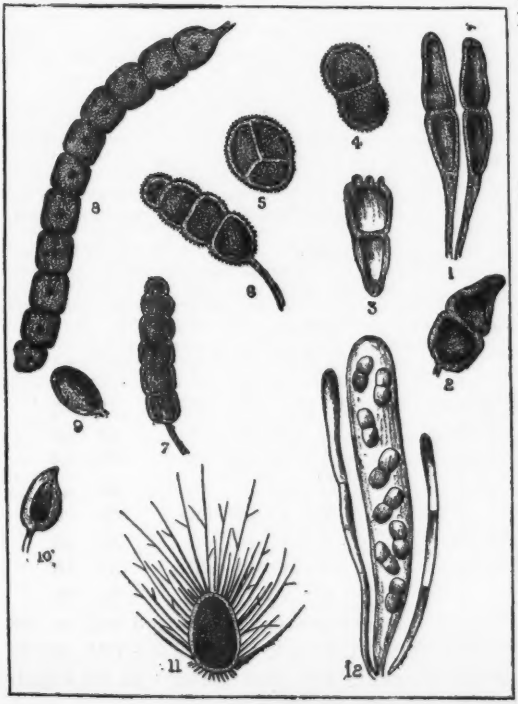


Figure 1 is a representation of the usually scattered positions assumed by the Goatsbeard Clustercups (*Æcidium Tragopogonis*). When infested it is usually found that nearly every leaf of the plant is thus spotted over with the fungus. The Clustercups are bright orange in colour. The Anemone Clustercups (*Æcidium leucospermum*) possess a similar arrangement of the cups, but they are chiefly aggregated towards the edges of the leaves, and are, when growing on the leaf, a pure white. This scattered arrangement is found in *Æcidium Epilobii*, and numerous other clustercups. In Ranunculus Clustercups the cups are collected in more or less rounded patches, as is also the case with the Berberry Clustercups. In nettles, and some other plants, the parasite attacks the stalks, and has an injurious effect upon the sap, when the stalks become swollen and distorted. Other and various arrangements of position of clustercups on plants will be met with by the student.

Figure 2 represents a side view of two clustercups of *Æcidium leucospermum*. This view can easily be obtained by cutting a section across the leaf. In the Berberry Clustercup the fungus is much more elongated. The various species differ considerably as to what may be called the height to which they grow.

Figure 3 represents a section of *Æcidium Grossularia* from my cabinet, an admirable preparation by John Barrow, Esq., of Manchester. The cup is partially open, and spores are rising to escape. We see but comparatively few spores, as doubtless a large quantity of them would escape during the preparation of the object.

Figure 4. This represents the position of *Ræstelia cornuta*, as seen upon the leaf of the mountain ash. Other species of *Ræstelia* vary as to the position they assume on the plant. The one on the hawthorn (*Ræstelia lacerata*) generally distorts the smaller twigs.

Figure 5 represents a fragment of *Peronospora infestans*, copied from a slide in my cabinet. The spores of the different members of the genus differ somewhat as to the mode of their arrangement, as also in size and shape.

Figure 6 represents *Ærisiphe lamprocarpa*, a fungus found upon various plants, amongst them *Salsify Scorzonera* and Plantain. It belongs to a very interesting group of microscopic plants, with radiating appendages, all worthy of careful study, and some of singular beauty.

Figure 6x represents an ascus, or fruit-bearing vessel, of *Erysiphe lamprocarpa*, with its two sporidia as usually seen.

* Micro-fungi: when and where to find them. By Thomas Brittain. (Manchester: A. Heywood and Son.)

Nyssia Hispidaria.

This much coveted prize of spring collectors made a sudden appearance in great abundance in Richmond Park on Ash Wednesday. I often wonder whether it is still to be found in its old haunts in Dunham Park.—E. M. G.

Pachycnemia Hippocastanaria.

Near Croydon, on the 6th of April last, I captured a fine specimen of this local insect on Shirley Common; about three weeks previously my father had a worn specimen brought him on Croham Hurst, in the same neighbourhood.—W. M. Geldart.

Personal Habits of Mr. Darwin.

The *Manchester Guardian* states that a Manchester gentleman has for some time been engaged in collecting the testimonies of literary and scientific workers as to the influence of alcohol and tobacco in literary efforts, and received the following letter from Professor Darwin—"Down, Beckenham,—Dear Sir,—I drink a glass of wine daily, and believe I should be better without any, though all doctors urge me to drink wine, as I suffer much from giddiness. I have taken snuff all my life, and regret that I ever acquired the habit, which I have often tried to leave off, and have succeeded for a time. I feel sure that it is a great stimulus and aid in my work. I also daily smoke two little paper cigarettes of Turkish tobacco. This is not a stimulus, but rests me after my work, or after I have been compelled to talk, with tired memory, more than anything else. I am 73 years old. Yours faithfully, Ch. Darwin."

Our Study Table.

Quarterly Transactions of the Barnsley Naturalists' Society. (Barnsley: T. and C. Lingard.)—These numbers contain a record of much active work. The most important contribution is Mr. Thomas Lister's list of the Birds of the Barnsley District.

The Bulletin Mensuel de la Societe d'Acclimatation contains many articles of scientific and practical value, and is a most interesting record of the work done by this useful and important association.

The Structure of the Cotton Fibre in its Relation to Technical Applications. By *F. H. Bowman, D. Sc., F.R.A.S., F.L.S.* Second edition. (Manchester: Palmer & Howe.)—It is not often that a technical work of this kind reaches a second edition in four months, and in this case Dr. Bowman has done even more than achieve success, he has deserved it. The questions he discusses in these lectures are—1. What is the typical structure of a cotton fibre? 2. What variations from this type structure are presented to us? 3. How far any variation in the ultimate fibre may affect its use in the manufacturing process? These problems are discussed in a practical spirit and with a full command of the resources of chemical and microscopical science. The book, which is well printed and illustrated, is an important addition to the literature of technology.

Report of Observations of Injurious Insects during the Year 1881, with Methods of Prevention and Cure, and Special Report on Turnip Fly. By *Eleanor A. Ormerod.* (Sonnenschein & Co.)—This bulky pamphlet is equally interesting to the entomologist and the farmer. The enormous damage that is now suffered by agriculture from insect plagues can only be lessoned by increased knowledge and the continuance of careful experiments. Miss Ormerod has devoted herself to the subject with a zeal and ability that are beyond all praise. In this report, as in her "Manual of Injurious Insects," she has shewn herself to be not only an indefatigable worker, but a clear and practical expositor. The elaborate report on the turnip fly in the present report may be especially commended. Without counting at all her services to entomological science Miss Ormerod has made good her claim to be deemed what so many profess to be—the farmers' friend.

The Scientific Roll and Magazine of Systematized Notes. Conducted by *Alexander Ramsay.* (Bradbury, Agnew & Co.)—To know *where* the data upon his subject may be found is one of the great difficulties of the scientific inquirer. Valuable observations lie scattered, and, to a larger extent, hidden in the proceedings of academies and learned societies, often difficult of access, and *sometimes* but imperfectly indexed. Some plan for facilitating reference to the great mass of existing scientific literature has long been felt to be a desideratum. This want Mr. Ramsay is making a courageous effort to supply in the *Scientific Roll.* Its main purposes "are to facilitate research, and to afford a medium by means of which scientific enquirers may help each other. It is intended to effect the first object by broadly classifying the sciences and grouping the various items under specified headings, so as to form a single series, so arranged that any person consulting the work will find collected in one place a key to the literature of the subject comprised in each heading; the second object will be effected by the usual method of questions and answers, and correspondence is therefore invited on science matters of all kinds." The first six parts deal with the subject of "Climate," and contain a very careful and full bibliography of the topic, followed by abstracts of a number of important papers, and by original essays. Reference is facilitated by a copious index. Mr. Ramsay deserves the highest praise for the energy and care he has displayed in his work. The seventh number begins the subject of "Aquaeous Vapour."

ON PLANT-DRYING AND SOME PHENOMENA OF VEGETABLE DEATH.

BY LEO H. GRINDON.

WE are now in the heart of the season when it is useful to give a little time to the preservation of plants for the Herbarium. Collections of dried specimens of course are not to be regarded as anything more than means to an end. It is not accumulating a vast quantity of vegetable mummies that makes a botanist, however elaborately they may be arranged, however pretty their epitaphs. Botany is the study of plants as they live and grow, their manners and customs, their curious ways and changes, noting these carefully, and then in order that the memory may be assisted at times when living examples are unfavourable, drying one or two good examples in the best possible manner, sorting and labelling them, so that the whole constitute a kind of dictionary. This is the true and essential idea of an Herbarium or Hortus Siccus, the only one that is to be approved, the only one that carries with it the ideas of common sense and of really practical results for good to the collector. When the work of our own hands can be supplemented with gifts from friends, and particularly from friends residing in foreign countries, so much the better. But it must never be forgotten that no one can ever claim exact knowledge of a plant who has merely seen it dead. The value to the sincere botanist of so simple a thing as a primrose, when he has examined it and dissected the parts, then laid it to dry for his Herbarium, and watched all that goes on during the process of desiccation, is tenfold greater than that of a score of specimens that he can contemplate only as ruins—tombs and sepulchres of beauty that he never beheld. Botanists who seek to acquire a very extensive knowledge of the forms of plants not cultivated in their own country must need be content with specimens preserved abroad; and well dried, such specimens are immensely valuable. But of course it is only form and general structure which they teach; and for the purpose of museum students, no doubt they well suffice. It remains true, after all, that the intrinsic value of an Herbarium is to be measured by the amount of record it preserves of personal work in the fields, in gardens, in conservatories, or wherever else the charms of the living and growing can be minutely examined.

The very ancient adage that if a thing be worth doing at all it is worth doing well applies to the preservation of plants for the Herbarium as much as to any great and important work or business. Specimens that are no better than fragments of brown stick, or that seem effigies of plants cut out of thin brown paper, the flowers shrivelled and shrunk so as to be no longer intelligible, the leaves crumpled and doubled up, everything confused and mashed together, such as one may see sometimes in collections, are altogether undeserving of the name. Nothing that is not dried in the best manner possible, its colours and configuration preserved as perfectly as the nature of the plant will admit, ought even to be allowed a permanent place in the Herbarium. The bad may be tolerated awhile, in default of better, but the further a specimen is from vivid and pleasing resemblance to the living thing, the speedier should be the endeavour to supersede it. Specimens from abroad that cannot be superseded of course we do not speak of. It is of plants within reach that none but admirable representatives of their best features while alive, should be considered worthy of a place. Plants dry very variously. Some require not a moment's trouble, others demand patience. Now and then the case is hopeless, and we are constrained to fall back upon the pencil, and prefer drawings, coloured ones if possible. Grasses and their allies, most kind of ferns, plants that resemble heather, "everlastings," the mature leaves of shrubs and trees, call for only the minimum. Those which try the patience, and can be managed only after

considerable experience with easy ones, are such as may be illustrated by citation of the hyacinth. To secure the best results, obtain first half a dozen pieces of stout millboard, cut to about eighteen inches by twelve. Then gather together a hundred old newspapers, and fold them neat and square to about the dimensions of the millboards. Four or five yards of common white cotton wadding, a score of sheets of tissue paper, and as many of blotting paper, all cut to the same size, complete the apparatus. One of the boards serves for the foundation; on this lay a newspaper, then a piece of wadding, and upon this place the specimen intended to be dried. The cotton being soft and retentive, every portion can be laid in a proper and natural way, including the petals of the flowers. A newspaper above, two or three if the specimens have thick stems, and so on, till all shall be deposited in the way of the first. If the specimens are sticky, or hairy, or of a kind that the wadding seems likely to adhere to, then, before depositing them on it, introduce a half sheet of the tissue paper. A heavy weight must be put on the top of all, sufficient to embed the specimens in the wadding; then leave the whole to rest for twenty-four hours. All the papers must then be changed, dry ones being put in their place; and if the plant seems to throw off a very considerable amount of moisture, such as will render the wadding quite damp, change the wadding also. A second and even a third change is desirable, at the end of two or three days or a week, and when this is made introduce the blotting paper, pressing again till everything is perfectly flat, and the specimens are absolutely dry.

Such is the simple process by which the writer of these lines has succeeded in the art of preserving the colours and forms, not only of robust and tractable plants, but of the most delicate, and very many of the obdurate. Every petal, every leaflet, retains the form it had in life, and nine specimens out of ten keep their colours excellently. To ensure the keeping of *colour*, it is well, if time can be spared, to change the blotting paper many times, and to dry it thoroughly before the fire, but this need not be done till after the third day from the beginning.

Most curious are the phenomena now to be witnessed. If those pertaining to the history of life are full of interest, those which accompany death almost equally arrest attention. The grand conspicuous phenomena of autumn we do not here so much refer to as to those observable during the preparation of Herbarium specimens. In autumn, as well known, the leaves fall in consequence of the development of a peculiar layer of cellular tissue at the point of junction of the petiole to the stem of the plant; while the colours come of the leaf being "super-oxygenated." But no one has yet uttered so much as a hint as to why some super-oxygenate into yellow, others into crimson, others into brown; one here and there, the ash for example declining to super-oxygenate at all, and simply dropping to the ground. Leaves and leaflets when drying between papers, are often cast off, probably in consequence of derangement in the onward flow of the sap. This happens very markedly in fir-trees, ericas, the wistaria, and various species of cissus and ampelopsis. Peduncles and petals also leave go, as in berberies, flax, the Boussingaultia and many solanums. The entire inflorescence of that beautiful grass, the Zizania aquatica, falls to bits so completely that a skeleton only remains. Crimson flowers very often change to a fine violet-purple, as in the case of the erica cinerea, the Lagerstrœmia, cyclamens, and the hairy willow-herb. The cowslip, on the other hand, changes from yellow to green; and the vanda from white, variously and exquisitely mottled, to irrepressible black. Not unfrequently the entire plant changes to black, and will not be hindered, as happens with the aucuba, the lathræa, and the monotropa, in the two last of which, being parasites, we might perhaps expect it; but the aucuba—well, why here?

Many plants, while drying, after death give out an agreeable perfume. New-made hay supplies a familiar illustration. We have other examples in the sweet melilot and the woodruff. Sometimes the petals shrivel and contract in a very singular manner, quite different from the usual, as seen in agrimony and the Bauera; or they go into glassy films, as in the eucharis. Anemones, poplars, droseras, hellebores, stain the paper, the dye often not coming out for many months, and even years. Mercury is content to assume a beautiful indigo blue colour, which, it is said, can be extracted.

These are but a few of the curious changes that could be mentioned. They are given with a view to showing the beginner that he must never be astonished at what may occur. In the case of change of one pleasant colour to another, there is nothing really to regret. The only thing to lament over when one's specimens are of colours they need not be, is that we have ourselves been unskilful or neglectful.

THE NEST OF A FROG-HUNTING BIRD.

BY THE REV. E. M. GELDART, M.A.

MY son, aged nearly twelve, having a half-holiday and thinking the weather and the season inauspicious for lepidoptera, lately condemned me to a sedentary course of cigarettes in the neighbourhood of some ponds in the disused brickfields close to here, while he fished for newts, or, as they call them here, "efforts"—i.e. efts. Very soon a group of youngsters (National School children) declared they had found a kingfisher's nest, which they recognised by the number of frogs' skeletons and mutilated frogs, of which it seemed mainly to consist. I could not see the so-called nest myself, as it was on a kind of island connected with the mainland by two quaking planks on which I did not dare to trust myself, but my boy crossed the precarious bridge and brought away one of the skeletons. I am no ornithologist, but suggest the question, would the kingfisher build on flat ground level almost with a pond? I thought they were found on river banks and far from human habitations. Some of the boys deposed to having seen what they call "water-hen" in these ponds. Would that be sufficient to account for the frogs' skeletons? Such a bird might have flown over from the Crystal Palace lake, which is only some three miles off, and contains a considerable variety of water fowls. If any of your correspondents can throw light upon this matter I should be glad. That the charnel house in question was the den (rather than nest) of some carnivorous creature, most likely a bird, there can be no doubt.

Croydon.

Early Appearance of Lepidoptera.

In illustration I may quote a small Pieris (Rapae? or Napi? not caught and identified) on March 15th; *Amphidasys Prodromaria* and *Tephrosia crepascularie*, March 8th; *Hibeonia Leucopleararia*, January 10th; *Anisopleyx Æscularie*, January 29th. The first was observed last year by us on March 5th. Yesterday (May 10th), *Argynnis Euphrosyne* was already on the wing in West Wickham wood.—E. M. G.

Rabbit Devouring Worms.

A few days since I observed, with considerable surprise, a common tame rabbit devouring earth-worms with evident relish, eating them in precisely the same way as he was in the habit of eating pieces of straw or hay. The worms were being administered by a boy, who informed me that he occasionally gave the animal a few worms to eat, and was of opinion that they produced no harmful effect. Perhaps some of your readers have observed this carnivorous habit. I do not myself keep rabbits, so cannot say anything as to their habits when in confinement, but the above struck me as being somewhat unusual, and consequently worthy of note.

June 10th, 1882. W. J. V. VANDENBERGH.

WHO TOOK THE FIRST PHOTOGRAPHIC PORTRAIT?

BY DUDLEY ARMYTAGE.

NOW that photographic portraiture has attained so great an extension, it cannot be without interest to recall the circumstances under which likenesses from life were first taken by a photographic process. The discovery of Daguerre was made known in France in 1839, but the first sun pictures were of inanimate objects only, and its application to portraiture was regarded as somewhat chimerical. When the news of the new discovery reached America Dr. John William Draper, putting an ordinary spectacle lens in a cigar box, began to experiment, and succeeded easily in obtaining views from the east windows of the New York University Chapel. One day he determined to try the experiment of taking the human face, which it was said Daguerre had not yet succeeded in doing, although M. Arago had stated that he was hoping soon to overcome the difficulties.

In October or November, 1839, having covered his assistant's face with white powder, and taught him to sit still for a long while, Dr. Draper managed to get a likeness. That was the first ever obtained by the Daguerre process. In April, 1839, Professor Morse and Dr. Draper opened a primitive gallery on the top of the University Building. Professor Morse was at that time teacher of painting and the fine arts, and Dr. Draper was professor of chemistry in the University of New York. Thus Morse supplied the artistic element whilst Draper attended to the scientific manipulation. The gallery was not a very elegant one—an old room was used for a workshop, and a hastily constructed shed, with a glass roof, served for an operating room—but nevertheless it was a grand success.

During the summer vacation the firm had all the business they could possibly attend to at £1 a picture. All the best known people of the city sat for their portraits. Among others a very good picture was taken of Mr. Frelinghuysen, then candidate for vice-president. The main drawback to the business was in the fact that it was only on very bright sunshiny days that they could succeed in getting anything like a satisfactory daguerrotype. On dark days they used to teach the art to would-be photographers, who came from all parts of the country to learn it.

Dr. Draper recorded his success in the *Philosophical Magazine* for September, 1840. This account is reprinted with an historical note in his "Scientific Memoirs." (London, 1878, p. 215.) From these sources and from the *New York Herald* of January 5th, 1881, we have derived the above statements.

Dr. Draper soon found that it was a mistake to suppose that no impression could result unless the face of the sitter was dusted with a white powder. Daguerre required from twenty to twenty-five minutes to take a landscape, but under the brilliant sky of New York, on a bright day and with a sensitive plate, Dr. Draper was able to take a portrait in the course of five or seven minutes. "The chair," he says, "in which the sitter is placed has a staff at its back, terminating in an iron ring, which supports the head so arranged as to have motion in directions to suit any stature and any attitude. By simply resting the back or side of the head against this ring it may be kept sufficiently still to allow the minutest marks on the face to be copied."

On a future occasion some other notable achievements of Dr Draper may be passed in review. Sufficient has perhaps been now offered to shew that he was the first to take the portrait of a human being by photography.

A Remarkable Swan.

A swan belonging to Mr. Randle Wilbraham, Rode Hall, has recently hatched nine young ones. Last year it hatched the large number of seven, and the year before six, thus making 22 in three years, and all of them have done well.—*Chester Courant.*

THE APOLLO SAUROCTONUS OF PRAXITELES.

BY WILLIAM E. A. AXON, M.R.S.L.

AMONGST the most interesting remains of ancient art we may class the statue of the young man and the lizard, usually known as "Apollo Sauroctonus;" or, Apollo the Lizard-slayer. Its popularity in the ancient world is shewn by the existence of several copies in bronze and marble. There is one in the Vatican, another in the Villa Borghese, and another in the Louvre. There is an epigram of Martial's which doubtless refers to this statue.

SAUROCTONUS CORINTHIUS.

"Ad te reptanti, puer insiodiose, lacertæ
Parce, cupit digitis illa perire tuis."
(*Ep.* xiv., 172.)

The statue is universally ascribed to Praxiteles, of whom Pliny says:—"He also made the youthful Apollo, known as the Sauroctonus, because he is aiming an arrow at a lizard which is stealing towards him." (*N. H.*, xxxiv., 19.)

Lübke's description of the statue is as follows:—"Similar youthful grace and soft suppleness are exhibited in the bronze statue of an Apollo, who, as Sauroctonus (the lizard-killer), is watching with the arrow in his hand for one of these pretty creatures. As we possess several copies of this work, both in marble and bronze, we can form a tolerably accurate idea of it. The still youthful god, with his arm bent forward, is leaning against the stem of a tree, up which the lizard is running; the right hand, which has been clumsily restored, must have held the arrow. The artist has here made use of the circumstance that the lizard, as a creature of presage, stands in relation to the god of prediction, and, by a playful application of it he has produced a pretty genre work, which, without any deeper spiritual value, is attractive from the elegance of the attitude, and from the youthful beauty of the figure." (*History of Sculpture.* English edition, vol. i., p. 192.)

Mr. T. Eimer has recently attempted to overthrow the ancient and so far universal interpretation of this statue. In his memoir on the *Lacerta muralis caerula*, he described the method, common in Italy, by which boys catch lizards. They make a noose at the end of a long stiff haulm of grass, and fill it with saliva so that it has the appearance of a bright mirror. The stiff grass is held towards the inquisitive little creature, which gradually comes so near in order to examine it that the noose is easily slipped over its head. "The whole bearing," he says, "of the Sauroctonus, which is quietly expectant and almost negligent, the attitude of the right arm and hand, the mode in which the latter holds the rod in its fingers, lightly and easily, not firmly and securely as one holds a dart with which one intends to kill, and, lastly, the peaceable expression of the face indicating sport rather than anything serious, all appear to me to shew definitely that the Sauroctonus we have before us is a boy waiting for a lizard with a grass noose and not with a dart. It is by this explanation that the whole statue becomes intelligible, and appears in all its harmonious truth to life." Dr. Eimer's paper appeared in the *Archiv für Naturgeschichte*, xlvii., 1881, p. 514; and there is an English translation in the Annals and Magazine of Natural History, 5th S. ix., 1882, pp. 138-140.

In the copy in the Louvre the left hand is extended as though to invite the attention of some one else to the little creature.

If it were not for the testimony of Pliny it may be doubted if the statue would have any title more definite than the Boy and the Lizard. Neither the traditional name nor Dr. Eimer's explanation appears to be entirely satisfactory.

Identification of Plants.

Please say in July number whether specimens of wild flowers may be sent for identification.—NORTH LINCOLNSHIRE VICAR.

[We shall be glad to assist readers in the identification of specimens.—ED. *F. N.*]

THE NAME "MAMMOTH."

BY HENRY H. HOWORTH, F.S.A.

THERE is perhaps no inquiry in the whole range of Natural History so full of romance of every kind as that which deals with the Mammoth and its surroundings. It is singularly interesting to find a region now so inhospitable and antagonistic to life as Northern Siberia, strewn with the bones of immense elephants so well preserved that their tusks form a considerable portion of the ivory in use in the world; but our interest increases to the highest pitch when we actually meet, not only with the bones, but with the flesh and other soft parts of these elephants preserved in the frozen earth of that district so perfectly and completely that the wolves and bears can and do still feed upon it. The surface of the vast flat mossy waste, to which the Russians give the name of Tundra, and which forms the northern parts of Siberia, is so inhospitable, that during the winter months nothing can apparently live there but the snowy owl and the raven, and it is covered with snow for many months in the year. Yet beneath it the bodies of these great elephants are found lying preserved as in a gigantic meat-safe. Questions of all kinds are immediately suggested by this mysterious and paradoxical fact. We are not going to discuss them to-day, but to limit ourselves to a few sentences devoted to the name by which these elephants are known all over Europe, and which, like everything else about them, has a certain romantic flavour.

In the year 1666, a learned Dutchman, named Cornelius Witzen, who became burgomaster of Amsterdam, visited Moscow. From the materials he there collected, and from various other sources, he compiled a famous work which he afterwards published at Amsterdam, entitled *Noord en Oost Tatarye*. Of this work the first edition appeared in 1694, and other editions in 1705 and 1785. It has never been translated into any other western language, and remains still buried to a large part of the scientific world in the original Dutch.

In this work *the name* Mammoth appears for the first time, and is there written Mammout. Witzen describes how numbers of elephants' teeth are found on the banks of the Siberian rivers, and says "by the Inlanders," *i.e.* the Russian settlers in Siberia, "these teeth are called Mammouttekoos, while the animal itself is called Mammout."—(*Op. cit* ed. 1785, 742). In the *Grammatica Russica* of Ludolf, published in 1696, p. 96, these bones are called Mammotovoi Kost. Among the Russians the name is invariably written Mamont—Bull. St. Pet. Acad. x. 258. The insertion of the *n* in this form is no doubt a corruption, although an old corruption, since Captain J. B. Müller, in 1716, says "the inhabitants (*i.e.* the Russians) call the beast Mamant." Schiefier explains it as due to a confusion made by the peasants between the name Mammoth and that of Saint Mamas, called Mamant by the Russians, to whom the second of September is dedicated in the Russian calendar—(*id. note* 2). Pallas derived Mammoth from the word Mama, which he says means earth in the Tartar tongue, but as Baer says, in the great Polyglot, edited by Pallas himself, in which the various dialects of Tartar are illustrated, no such name as Mama occurs as a synonym for earth. Baer himself suggests that the name is derived from ma, which means the earth in various Fin dialects, while mut or muit is the name by which the mole is still known to the Esthonians, whence he explains Mammoth as meaning the earth-mole—(Bull. St. Pet. Acad. x. 258). Not only is this an inconsequential etymology, since all moles live under ground, but the notion of finding an explanation of the name among a people so far removed from Siberia as the Esthonians is quite fanciful. Klaproth was told by the Buriat and Mongol Lamas whom he consulted in

1806, that the name was of Tibetan origin. This again is a most unlikely quarter to go to for our etymology. A much more reasonable explanation of the name was given long ago by the Swedish exile to Siberia, Strahlenberg, who wrote his well-known description of the north and eastern parts of Europe at the beginning of the last century. In the 13th chapter of this work, under the heading Mamatova Kost, we read "As to the name it doubtless had its origin from the *Hebrew* and *Arabick;* this word denoting *Behemot*, of which *Job* speaks (in the xi. chapter), and which the *Arabs* pronounce *Mehemot* * * * * This is certain, that they (*i.e.* the Arabs) brought the word into Great Tartary; for the *Ostiacks* near the river *Oby* call the *Mammuth Khosar*, and the Tartars call it *Khir;* and although the *Arabian* name of an *elephant* is *Fyhl*, yet if very large they add the adjective *Mehemodi* to it; and these Arabs coming into Tartary, and finding there the relicks of some monstrous great beasts, not certain of what kind they might be, they called these teeth *Mehemot*, which afterwards became a Proper Name among the *Tartars*, and by the *Russians* is corruptly pronounced *Mammoth*. * * * The *Russian Mammoth* certainly came from the word *Behemot;* in which opinion I am confirmed by the testimony of an ancient *Russian* Priest, *Gregory* by name, Father-Confessor to Princess *Sophia*, who was many years an exile in *Siberia*, from whom I was told, that formerly the name for these bones in *Siberia* was not *Mammoth*, but *Memoth*, and that the *Russian* dialect had made that *alteration*."—(*Strahlenberg Eng. ed.* 403). This view is curiously confirmed by the fact that Father Avril, a Jesuit, who went overland to China in 1685, and who is quoted by Witzen in the notices he gives of the Mammoth, never calls it Mammoth, but always Behemot.—(*Avril's Travels, Eng. ed.*, 175 177). Witzen himself also says that these teeth belong to the beast *Behemoth*, called Mammout, otherwise Mammona by the Russians.—(*Op. ist*, 742.) The Turkish dialects habitually interchange the letters B and M, which are, in fact, used indifferently by them, so that the change from Behemoth to Mehemoth is perfectly regular and natural, and we can hardly doubt that Mammoth is in fact a mere form of Behemoth. At first it looks strange that the Arabs should have given a name to this beast which has become current all over the world; but this is easily explained when we remember the immense enterprise and energy of the Arabs in the ninth and two succeeding centuries, when, as we know, their traders and emissaries frequented the borderlands of Siberia, and probably first initiated the trade in fossil ivory in the west. We, at all events, have unmistakeable evidence that the remains of the Siberian Mammoth were well known to them. The geographer, Kazvini, in his article Bulghar, by which name he means the kingdom of Great Bulgaria on the Volga, which doubtless extended considerably into Siberia, whose old capital still remains in the village of Bolghari, cites Abu Hamid el Andalusi for the statement that bones of an immense size were often found in Bulgharia. The Arab writer tells us he had seen a tooth four palms long and two wide, and a skull which resembled a hut. Teeth resembling the tusks of elephants, white as snow, and weighing as much as 200 menns, were also disinterred there. It was not known to what animal they belonged, but they were transported to Khuarezm (*i.e.* the modern Khiva), where they were sold at a great price. Out of them were made combs, vases and other objects ordinarily fashioned out of ivory.—(*Voyage d'Abul Cassim, by D'Ohsson*, 80. *Fraehn Ibn Fozlan* 228 and 229, *notes*). Father Avril's narrative shows that this trade still survived in his day, and he tells us the Persians and Turks put a great value on elephants' teeth from Siberia, and preferred a scimitar or a dagger haft made of this precious ivory before a handle of massy gold or silver. There is, therefore, every

reason to believe that the name Mammoth, as well as Mammoth ivory itself, were first introduced to the notice of the western world as an article of commerce by the Arabs, who were familiar with it probably as early as the ninth century.

ON THE SENSE OF LOCALITY IN ANIMALS.

BY JOHN HOLT.

I AM desirous of adding another instance to those already given of the possession of the organ of locality by creatures of the brute creation. So far as I am aware the story has not before appeared in print. It was related in my hearing, about thirty years ago, by an individual who was at that time eighty years of age, and was therefore living contemporaneously with one of the chief actors in the singular occurrence. He had, moreover, throughout a long life-time regularly visited Alkrington Hall on business, and consequently had opportunities for verifying the truthfulness of his story:—On one occasion, in the closing years of the last century, Sir Ashton Lever went to London on horseback, accompanied by a favourite dog. After staying in the metropolis some time, he prepared to return to his home at Alkrington, near Middleton. For some reason not explained he started without the canine friend which had been the companion of his journey from his ancestral seat. After he had been gone a short time, however, the faithful hound missed its master, and though it sought eagerly all over the place where he had been staying it could not find him. Rooms were inquiringly peered into, faces were carefully scanned, but it was unable to discover any traces of the missing one; it therefore resolved to quit a place which had lost the only attraction it had ever possessed for the poor brute, and nothing more was heard of it for some days—how many days I was not informed; but eventually it arrived at the door of Alkrington Hall, where it uttered a weak whining cry, which was heard by one of the servants, who at once admitted the toil-worn wanderer. Lean, lame, and scarcely able to walk, it crawled with difficulty to the fire in its master's drawing-room, stretched itself out upon the hearth-rug, and directing a last fond look towards its owner, who had arrived some time previously, suddenly expired.

Harpurhey.

MELANISM: A BLACK HARE.

BY FR. TIEMANN.

(*Conservator of the Zoological Museum at the University of Breslau.*)

A BLACK hare, one of the rarest sights, not merely in Silesia but in Western Europe generally, has been visible for fourteen days in the Chase of Dr. Websky at Poln-Peterwitz. So rare is this article of game, that only one previous appearance is recorded. This was in December, 1873, on an estate of Count Chamarée, at Frankenburg. Although the black variety is so exceedingly rare in West Europe, yet in one part at least of East Europe, the province of Mohilew, it is very abundant. Melanism occurs in various species of animals, but is far rarer than albinism or the absence of colour in animals that are usually coloured.

The black variety has further been observed in leopards, panthers, jaguars, wolves, foxes, rats, and squirrels; further in birds, for instance in bullfinches, and finally in beetles. By the rarity of real black varieties, it is quite natural that prices of the skins of such animals which are used for furs are respectively high quoted. Staatsrath Professsor Dr. Gruber mentions once to have seen at St. Petersburg a fur of black fox, for which the merchant asked the sum of 4,000 silver roubles. The choicest skins of that kind usually go to the imperial court of Russia.

TREE YIELDING FRUIT EVERY MONTH.

AT the meeting of the British Association in 1857, Mr. N. Niven made a curious communication as to the remarkable result of an experiment he had made upon a fruit-bearing tree. He had been struck by the passage in the last chapter of Revelations, where the "tree of life" is described prophetically as bearing "twelve manner of fruits, and yielding her fruit every month." Struck with this description, he was led to consider what possible approximation could be made towards such a result, with the means placed, under the present order of things, at his disposal. From amongst our hardy fruit-bearing trees he made choice of the pear, fixing upon a highly vigorous and healthy young specimen then in the course of ordinary training, that had been previously worked or grafted, and which had arrived at fruit bearing. This tree occupied a portion of the walls of his residence, having been planted on an angle of the building, occupying thereon two aspects, the one east, the other south or nearly so, the leading stem or trunk being on the angle, the side branches being horizontal, thus as it were at this point clasping the two walls of the house. His object was, if possible, to endeavour to construct a tree that would yield a succession of fruits for each month of the year complete. In the specimen fixed upon there were twenty horizontal branches on each side, thus presenting facility for the insertion by grafting of forty varieties or kinds of pears. Accordingly, the following selection and classification of sorts were made, put on, and labelled, viz.:—

MONTHS.	NAMES.
For July	Citron des Carmes
,, ...	Doyenne d'Eté
For August ...	Jargonelle
,, ...	Belle d'Aousti
,, ...	Beurré Giffart
For September	Beurré d'Amanlis
,,	Denmore
For September	Frané Réal
,,	Colmar d'Eté
For October...	Autumn Bergamot
,, ...	Beurré Spence
,, ...	Flemish Beauty
,, ...	Louis Bonne of Jersey
,, ...	Onondago
,, ...	Seckrel
For November	Bergamot d'Esperen
,, ...	Beurré Dièl
,, ...	Colmar d'Aremberg
,, ...	Duchesse d'Angoulême
,, ...	Napoleon
,, ...	Thompson's
For December	Beurré Bosc
,,	Glout Morceau
,,	Hacon's Incomparable
,,	Winter Nelis
,,	Triomphe de Joidoigne
For January...	Beurré Langelier
,, ...	Broome Park
,, ...	Winter Crassum
,, ...	Knight's Monarch
,, ...	Soldat d'Esperen
For February	Easter Beurré
,, ...	Winter Beurré
,, ...	Josephine de Malines
For March ...	Crassune d'hiver
,, ...	Ne plus Meuris
For April	Beurré Rance
,, ...	Late Bergamot
For May	Beurré Rance
,, ...	Beurré Brittoneur
For June	Suzzette de Bavey
,, ...	Beurré Brettoneau

In the spring of 1855, the scions of these various varieties were inserted one upon each branch, all of which had been cut back to within six inches of the main stem. Thus the important process of what is called *double grafting* or *grafting upon a graft*, was effected, a process greatly tending to extra fruitfulness in the tree. Almost each graft of the above succeeded, and the growth of the whole came off simultaneously, and with nearly equal luxuriance, the same healthful progress resulting in 1856, but with the interesting addition of numerous sets of flower-buds on many of the grafts. In the spring of 1857 the

blossoms set freely, and when Mr. Niven read his paper there were upwards of one hundred fine specimens of fruit upon so many of the sorts, that they will, he says, "in the order of their ripening, nearly, if not fully, realize the result hoped for."

"The value and importance of the above result," said Mr. Niven, "particularly where wall accommodation is limited, will at once appear; but besides this, the opportunity that will be presented for comparison between one variety and the other, and the ready ascertainment of their respective qualities and characters, must greatly tend to the enjoyment and pleasure, as well as profit, of the interested cultivator." Has this experiment been repeated? M.

Character and Handwriting.

It may safely be affirmed, in reply to the query on page 12, as a general rule, that character *cannot* be determined from handwriting. Undoubtedly in many cases there is a striking resemblance between the character of the writing and the known character of the writer, but it is quite impossible for a stranger to the writer to draw correct inferences in such a case. The present writer has many times carefully noted the characteristics of various handwritings, and endeavoured to found general conclusions as to the writers. In almost every case these preconceived notions have been utterly dispelled at a personal interview. It is common enough for men of strength and force of character to write feeble scrawling hands, while men below the average in this respect will write hands *masterful* enough for a ruler of Bismark's calibre. As the result of my observations, I have been led to summarise thusly:—1. The handwriting varies (more or less) according to place, time, temper, good or bad pens, smooth or rough paper; whether pen or pencil is used; health or ill-health. 2. When writing letters most people try to write their "best," and the consequent stiff formal hand must conceal rather than display self. 3. Many people get nervous and fidgety when called upon to write a letter—these qualities being altogether foreign to them otherwise. 4. Many people get schooled into a style of handwriting, which displays nothing so much as the teacher's skill and the pupil's aptitude. 5. Any happy guess at character (by professional character-readers or others) is founded more on the subject-matter of a letter, or the style in which the subject-matter is treated, rather than inferred from the style or appearance of the handwriting itself. 6. Again, a person writes more deliberately and slowly when writing about an unfamiliar subject than when dashing off an impromptu note on a familiar matter. Thus the same writer may show two very different styles almost at the same moment.—W. Hellier.

The Herling, Whitling, or Whiten.

In the rivers flowing into the estuary of the Solway (but whether in other rivers in that district I cannot say), there occurs in August a very great run from the sea of the fish bearing the above names, which are used indiscriminately. Can any reader tell me—1. Is this fish found elsewhere than in the Solway rivers? 2. Is it a mature fish? (It is never found over 1½lbs. in weight.) 3. Is it, as is sometimes asserted, a salmon in an infantine state, or a cross between some species of trout and salmon? 4. Can its young (supposing it to breed) be distinguished in the parr state from the young of the salmon or the sea trout?—Piscator Lancastriensis.

Do Fishes feel Pain?

The Rev. M. G. Watkins, in writing of Mrs. Meredith's *Tasmanian Friends and Foes*, says—"Some curious stories are related of fish taking the hook almost immediately after breaking away from another which they perhaps carry at the time in their mouths, and which may show anglers how insensible to pain is their quarry. The same thing must have been noticed by every English trout-fisher. We know of a large trout, for instance, which was taken in Loch Awe, and when caught with an artificial minnow had no less than five other minnow tackles, all bristling with hooks, hanging round its mouth."—*Acadamy*, 13th Nov., 1880.

What is the explanation: is it insensibility or stupidity?—F.S.

MIMETIC RESEMBLANCES AND MIMICRY IN ANIMALS.

BY J. E. PEAL.

WE take the following from the *Scientific Roll*, No. 7. The editor says:—"Replies to questions should be remembered in accordance with the questions to which they refer. The contractions following the questions and answers indicate the class of notes to which they will ultimately be assigned, and the place where full references will be given to the details bearing upon them. *M.* Mammalia; *R.* Reptilia; *L.* Lepidoptera; *O.* Orthoptera." Communications on this subject may be sent to Mr. Ramsay, 7, Red Lion Court, London, E.C., or to the editor of this Journal.

Some sketches, illustrative of a remarkable case of a caterpillar belonging to a species of moth, the name of which we have not been able to ascertain, have been sent to us by J. E. Peal, of Aideo, in Asam. The caterpillar has a striking resemblence to a species of *Viverra* inhabiting the same district. We are also indebted to the same correspondent for the following note.

"The most general and interesting law, as far as I see, in the mimicry of inanimate things by animals, or insects, is the remaining quite still till the last possible moment. I often pin moths ere they move, and catch butterflies with my fingers. The range that this quality takes is also much wider than is usually supposed: not only is it for protection as in 'protective resemblance' (as when a caterpillar exactly resembles the buds it feeds on and lives among); but also as a means of luring insects, as in the *Mantis*, that resembles a blossom. Again, the tiger imitates the whistle of the large Sambur deer here (to call it) so closely that only a trained ear can tell the difference. The leopard also imitates the smaller deer. It is a common custom of all hunters to call deer by whistling with a leaf, and I have done it myself. Occasionally, as might be expected, a tiger, and not a deer, turns up at close quarters, when the astonishment is mutual. The crocodile's eye and nose floating on our muddy waters also exactly resembles the lumps of dirty foam so common here, and I have often, in my Rob Roy canoe, passed close to one and knew it would not move. There is a *Viverra* in these hills, so far unknown to me, but it catches hawks by hiding its body under a bare and very conspicuous branch of a tree, as in these hill-clearings, while it turns its tail over on top and keeps jerking it; any hawk within range at once takes it for a squirrel, and, acting accordingly, gets caught."

The statements respecting the *Viverra* depend upon the testimony of individuals belonging to the Naga tribe. The following questions are suggested by the above:—

1. Are any other cases known of lepidopterous caterpillars resembling species of Mammalia? (L. 1.)

2. Would readers supply instances of caterpillars resembling species belonging to other classes of animals than the Mammalian? (L. 2.)

3. What mimetic resemblances are there between caterpillars and the various parts of plants, as twigs, buds, etc.? (L. 3.)

4. What instances are there of mimetic resemblances in *Mantis* and other genera of the same family to the leaves, stems, blossoms and other parts of plants? The names of the animals and plants should be given, and such particulars as regards habits, etc., as seems to afford some explanation of the phenomena. (O. 1)

5. What instances are there of the *Carnivora* imitating the call of their prey for the purpose of luring them? (M. 1.)

6. What instances are there amongst the reptiles of mimetic resemblance to inanimate objects? (R. 1.)

7. What instances are there amongst the species of *Viverra* of cunning displayed for the purpose of inducing the near approach of prey? (M. 2.)

We shall be glad to have any other questions and notes on the subject.

PLANT CLIMATOLOGY OF EUROPE.

BY DR. HOFFMANN AND DR. EGIN IHNE.

WE appeal to all who are interested in the periodical phenomena of plants to make numerous and exact observations, with a view to a comparison of the various parts of Europe, in relation to the influence to what may be termed Plant Climatology. For these observations as to the influence of climate we would particularly recommend the following plants as suitable. The figures placed after the names indicate the mean state for Giessen, reckoned from observations extending over many years. Plants on espaliers should be excluded from these observations, which should be made only on plants standing free. Observations should be made and recorded daily. This is the only way in which to obtain reliable results.

A.—FIRST BUDS OPEN.

1	Ribes rubrum	14	April
2	Prunus avium	19	,,
3	Prunus spinosa	20	,,
4	Prunus Cerasus	22	,,
5	Prunus Padus	24	,,
6	Pyrus communis	23	,,
7	Pyrus Malus	28	,,
8	Syringa vulgaris	4	May
9	Lonicera tatarica	4	,,
10	Narcissus poëticus	5	,,
11	Aesculus Hippocastanum	7	,,
12	Crataegus oxyacantha	9	,,
13	Cytisus Laburnum	15	,,
14	Sarothamus vulgaris	14	,,
15	Cydonia vulgaris	16	,,
16	Sorbus aucuparia	17	,,
17	Sambucus nigra	28	,,
18	Secale cereale	28	,,
19	Atropa Belladonna	29	,,
20	Vitis vinifera	15	June
21	Tilia europaea (gandifolia)	22	,,
22	Lilium candidum	1	July

B.—FIRST FRUIT RIPE.

23	Ribes rubrum	21	June
24	Lonicera tatarica	1	July
25	Sorbus aucuparia	30	,,
26	Atropa Belladonna	2	Aug.
27	Sambucus nigra	11	,,
28	Aesculus Hippocastanum	17	,,

Observations relating to the species numbered 1, 3, 8, 11, 17, 22, and 27 will be especially welcome, as Dr. Ihne is now at work upon a phænological map of them for all Europe.

We shall be glad to receive any observations made either during the present year, or in previous years, if still unpublished. Some of the ways in which these favours can be utilised, will be best understood by a reference to the map by Dr. Hoffmann, giving data as to the comparative phænology of Central Europe. (Vergleichende phænologische Karte von Mittel Europa von H. Hoffmann im Petermann's Geograph. Mitthiel, Januar, 1881: Gotha bei Perthes.)

Giessen, June, 1882.

Swallow-Stone.

With reference to a query as to Longfellow's allusion to the "Swallow-stone" in the *Field Naturalist*, p. 21, I send you the following extracts:—"In remote ages the swallow was noted for having taught men the healing properties of a certain herb (celandine or swallow-wort) by employing it to give sight to its young. Not only was it thus skilled in the healing art, but was in itself a medicine of no ordinary virtue. Even in the time of our countryman Ray, not two hundred years ago, its efficacy in various complaints was seriously believed: the whole body, burnt, was considered a specific for weak eyes, quinsy, and inflamed wounds. . . . . A *little stone*, sometimes found in the stomach of young birds, called chelidonius, tied to the arm, or hung around the neck, was a remedy against children's fits." — *British Birds in their Haunts;* Society for Promoting Christian Knowledge. "The swallow is said to bring home from the sea-shore a stone which gives sight to her fledglings."—*Dictionary of Phrase and Fable.*—NORTH LINCOLNSHIRE VICAR.

Mummy of a Cat at Workington.

While some alterations were being made in an old house in Nook-street, Workington, the other day, Mr. Porter, joiner, discovered the body of a mummified cat between the joists of the flooring. The cat must have been imprisoned when the floor was laid down. Its skin had become quite dried and tough, and it is believed the cat must have been in that position over a century.—*Whitehaven Free Press*, 10th June.

SOME QUERIES CONCERNING ANCIENT OCEANS.

BY ALEXANDER RAMSAY, F.G.S.

1. WALTERSHAUSEN assumes that in Silurian times a much larger proportion of the earth's surface was covered with sea than now. Why should he? What facts can be cited to support his assumption? How is he able to form conclusions as to what proportion of the present oceanic area was then sea; and what portion of it was then land?

2. Dr. Hicks has suggested that in the early period before the Cambrian, the lines of depression placed beneath the sea started from about the equatorial region of the middle Atlantic, and advanced north-east and north-west, so that at the commencement of the Cambrian it had reached Wales on the one side and the eastern shores of the northern United States on the other. The chief basis for this suggestion seems to me to be that during the Cambrian and subsequent periods, the advance of the sea over the area of Europe was from S.W. to N.E.; and it is assumed that in the antecedent times the advance had been continuously in the same direction. Are there any valid reasons for assuming that, tracking the progress of events backwards in time, the ocean's bounds receded from Wales to the equator? Is it to be accepted as a geological axiom that the ocean has advanced in diverging lines from central points?

3. Dr. Hicks's suggestion prompts other questions of a different character. He implies that the sea advanced from the equator in the middle Atlantic, N.E. to the coast of North America. What is the evidence upon which this implication is based? If I were to form an opinion I should certainly conclude that during the Cambrian period the sea advanced from where Newfoundland is now to the Texan area. This, if correct, will not harmonize with Dr. Hicks's views. Did then the pre-Cambrian sea advance upon the eastern side of North America from the S.W. or the N.E.?

4. In the period before the Cambrian, which may provisionally be called Pebidian, the advance of the ocean over the European area seems to me to have been from N.E. to S.W. This Pebidian sea in the European area became Pebidian land. If Dr. Hicks's views were accepted, one might conjecture that the Pebidian sea advanced to the equator, and was followed by a great wave of land advancing in the same direction, till it also came to the equator, when the pre-Cambrian sea commenced its advance towards the north-east. Would there have been sufficient time for the sea to have advanced from Norway to the equator and back again to Wales, between the laying down of the earliest Pebidian stratum and the lowest Cambrian conglomerate of Wales?

5. In describing the advance of the ocean as being towards some particular point of the compass, it is not meant that the waters progressed in straight lines; but that in spreading over the land the axis of greatest advance was in such and such a direction. Dr. Hicks gives the direction of advance of the Cambro-Silurian sea as towards N.E. But I would suggest that this is not precisely correct. In the lower Cambrian period the axial line of advance seems to me to have been in a curved line; the direction being at first towards N.E., and towards the end of this particular period almost due north. Is the main axial line of advance of sea usually straight or curved, or visible as regards direction? If curved, then it seems possible that the advance of the pre-Cambrian ocean over the Atlantic area may not have been from S.W., but from the W. and N.W. In such case it wou'd be easier to admit the probability of the apparent extent and fluctuations of the oceanic progress occurring during the time represented by the Pebidian period, than the probability of the surmises in questions 4.

BIBLICAL NOTICES OF GLASS.

BY THE REV. A. LOWY.*

THE Hebrew word *Zêchuchith* is employed to denote "glass." Whether it has this signification in Job xxvii. 17, or whether it relates to some precious stone, is a debateable question. The word *zêch uchith* means a pure substance, and does not imply transparency. The Phoenicians, though credited with the invention of glass, have not left any other records except the names of some makers of glass vessels. On some Phoenician relics occurs the name of Artas the Zidonian. Whether the Jews, as neighbours of the Phoenicians, were manufacturers of glass during the Biblical period of their history cannot be proved by any relics. Of glass which came from Assyrian excavations, the British Museum has several specimens; one of 700 B.C. bears the inscription of Sargon. A more direct insight is given by the Egyptian monuments, where we have pictorial representations of glass-making. The earliest relic, brought from Egypt, bears the inscription of Thothmes III., and was made 1500 B.C. The Coptic name of glass, *Badjiein* or *Abadjein*, and some variations of this word have no connexion with Semitic words. The Arabs have given a wide extension to the word *zajaj* or *zagag* among Mahomedan nations. But among the Aryan Mahomedans in India, in Persia, in Kurdistan, as also among the Turks, glass is called *shish*. In Hebrew *shish* or *shâyish* is the name of marble, and may eventually have been used in the signification of glass. Whether glass was in the earliest days manufactured in Palestine or not, glass vessels must have been known to the Jews. This is not solely to be inferred from the circumstance that the Palestine Exploration Fund has brought to light numerous fragments of glass vessels, for such vessels may have been made at a late period, but it is an indubitable fact that the Phoenician traders, according to the testimony of the Bible (Proverbs xxxi. 24, and Hosea xii. 8), constantly came to Judea to offer their wares. Israelite women liked to adorn their necks with glass beads. Specimens of such ornaments occur everywhere, note for example, the specimens found in the tombs of the Egyptians and the Etruscans. Among the treasures which Dr. Schliemann discovered at Hissarlick, the so-called site of Troy, and again in the graves of Mycenae, Egyptian or Phoenician glass beads have been found. Even beneath the lakes of Switzerland, where the pile-buildings of ancient inhabitants have been brought to light, glass beads were discovered, which none but Phoenician traffickers could have carried to Switzerland, just as they brought them into the lands of the ancient Britons. No doubt can therefore exist that the Hebrews of the earliest date were fully acquainted with articles made of glass.

* The above is an abstract of the introductory portion of the Rev. A. Lowy's interesting lecture, the whole of which, including his references to the post Biblical history of glass amongst the Jews, will appear in the "Transactions of the Society of Biblical Archæology."

Horses Eating Wood.

On a recent visit to Sheffield, I heard of a remarkable instance of the habit which horses acquire of gnawing and eating wood. How common this taste is may be seen from the way in which many mangers have suffered from equine teeth, but it sometimes attains great proportions. A horse which came on the stage of the Theatre Royal, Sheffield, in the cab scene in Watts Phillips' play of "Lost in London" was infected with this strange predilection in a marked degree. One night, whilst behind the scenes, it picked up a "property" lamp-post, and was beginning to make a hearty meal of it, when the occurrence was noticed, and the instrument of enlightenment was rescued from its teeth.—W.

Food of the Drosera.

Where is there a record of the observations of E. Regal, who is said to find that the *Drosera* thrive best when not treated with animal food?—A. C. E.

A SHEEP-KILLING PARROT.

BY A MANCHESTER PYTHAGOREAN.

THE possession by the Zoological Society of a specimen of the *Nestor Notabilis* has given rise to an increased interest in this strange bird, which offers a striking example of the manner in which the habits of animal life may be changed in consequence of the modification of the surrounding circumstances. A paragraph in the *Daily Telegraph*, which was copied into *Knowledge* (March 3rd, 1882) and many other papers, has acquainted the public with the general fact that this bird, originally frugivorous, has in late years developed a strong appetite for flesh-meat. Some further particulars may not be uninteresting.

The first recorded example was obtained in 1856 by Mr. Walter Mantell, and was described by Mr. John Gould, F.R.S., in the proceedings of the Zoological Society. It is also described in the "Supplement" to that gentleman's *Birds of Australia*. At that time nothing was known of the unusual tastes of the bird, which appear to have been first noticed about 1868, and first described by Mr. Thomas H. Potts, F.L.S.

At the date named many sheep were found to be suffering from a sore or scar on the back, immediately in front of the hips. In some cases it was merely a patch of the wool torn off, in others a severe wound so deep that the entrails protruded. The animals attacked were in good condition, and the wound appeared to be always made in the same spot. It was soon discovered that the aggressor was the kea, which seems to have had in view chiefly the possession of the kidney fat. "This," says Mr. Potts, "once plucked out the carcase possesses no farther attraction; it is quickly abandoned, and the dealer of mischief hies him off in quest of a fresh victim." This has earned for the bird, which was known to the Maoris as the kea, the name of the kaieo or sheep-killer of the southern alps. Mr. John Wood, F.R.S., exhibited at the meeting of the Pathological Society of London in November, 1879, the colon of a sheep in which colotony had been performed by a kea. The specimen had been forwarded by Mr. De la Tour. The bird settling on the sacrum tears off the wool and eats into the flesh till the sheep falls from loss of blood and exhaustion. Sometimes the wound forms an artificial anus in the right loin.

But though the kidney fat appears to be the favourite *bonne bouche* of the kea it is not the only sort of flesh-meat on which it regales itself. Two keas that had been partially tamed returned regularly to the house to be fed, and, whilst accepting any kind of food, evidently regarded a piece of raw flesh-meat as a delicacy. Dr. Buller says "that those frequenting the sheep stations appear to live almost exclusively on flesh. They claim the sheeps' heads that are thrown out from the slaughter shed, and pick them perfectly clean, leaving nothing but bones." Its manner of feeding is said sometimes to resemble that of a hawk, and at other times the usual fashion of a parrot. It is easily snared when tearing up the bait of a fresh sheep skin placed on a roof to attract it. In this the *Nestor Notabilis* is not so singular as is sometimes supposed. "It has," says Mr. Potts, "been before observed that some species of the *Trichoglossinae* affect a meat diet occasionally. The kaka is fond of picking up shreds of fat; whilst at some out-stations in the interior carcases of sheep hanging in the meat-gallows are at times covered with busy groups of beautiful green parroquets that move restlessly about within and without the carcases, rending away morsels of fat. Here we have representatives of two genera of our honey-eating parrots shewing a keen relish for grosser food than the delicate sweets that may be gleaned from expanded flowers."

The kaka—*Nestor Meridionalis*—has been accused of damaging trees by stripping the bark, but Mr. Potts believes that it does not injure any that are sound, but only those with a deceptively vigorous appearance, and which

are already doomed by the presence of the myriads of insects that form the favourite food of this bird.

Dr. Buller mentions in this connection a case in which a whole fraternity of caged parrots took to cannibalism, killing and devouring each other. He had in one compartment of his aviary an *aprosmictus scapulatus*, two *platycercus eximius*, two *platycercus pennantii*, and a *platycercus semitorquatus* which lived in peace for nearly two years. The last-named one was moody and shy, retiring to the highest perch under the domed roof and disputing its possession with the rest. One of the rosellas met with an accident and received much attention from its partner. The *platycercus semitorquatus* began to persecute the disabled bird, and eventually killed and partly devoured it. Although there was plenty of grain the *platycercus pennantii* followed suit. The original offender next killed one of the *platycercus pennantii*, and was removed whilst pursuing the remaining rosella. Next morning, however, the remaining *platycercus pennantii* killed the male *aprosmictus* and was devouring his body. The bereaved rosella now attacked the surviving *platycercus pennantii* and killed her. Thus within one week the peaceful aviary was reduced to a single male rosella, which afterwards escaped.

Some years ago the carnivorous habits of the kea were brought under the notice of the Manchester Scientific Students' Association, by Mr. G. C. Yates, F.S.A., and some incredulity was expressed. There is however no reason for doubt. Moreover, it is notorious that in captivity parrots often manifest a liking for flesh-meat, though certainly not to the inconvenient extent shewn by the kea.

Mrs. Carey-Hobson, writing in *Knowledge*, March 17th, 1882, has cited the parallel case of the baboons in the mountainous parts of the Karro plains towards Graaff Reinet, who have committed great depredations amongst the farmers' flocks. Formerly these animals were satisfied with prickly pears and other kinds of fruit, birds' eggs, locusts, and, as a rare treat, scorpions. It is only within recent years that they have been known to kill a sheep or lamb for food.

Perhaps a more remarkable instance, though one that is easily overlooked, is that of man himself, who, anatomically and physiologically is most closely allied to the *frugivora*, but has, as a vegeterian would put it, partially degenerated into a carnivorous animal.

The following references will be of use. Most of them have been consulted in the preparation of this note. Brehm (Dr. A.), Thier-leben: Vogel, vol. i., p. 166.—Buller (Walter Lawry, F.L.S., Sc. D.) History of the Birds of New Zealand. London: Van Voorst, 1873.—Finsch (Dr. O.), Revision der Vögel Neusielands (Journal für Ornithologie, Mars, 1872.)—Gould (John, F.R.S.), On Two New Species of Birds (nestor notabilis and spatula variegata), from the collection of Walter Mantell, Esq. (Proceedings of Zoological Society, pt. xxiv., 1856, p. 94.) It is also described in his "supplement" to the "Birds of Australia." — Potts (Thomas H., F.L.S.), The Kea Progress of Development. (Nature, vol. iv., p. 489.)—Change of Habits in Plants and Animals. (Nature, vol. iv., p. 262.)—Birds of New Zealand. (Zoologist, 2nd S. vi., 1871, pp. 2793 and 2853.)—On the Habits of the Kea; or, Mountain Parrot of New Zealand. (Zoologist, 3rd S., vol. v., 1881, p. 290.) In the above articles Mr. Potts refers to his papers in the third volume of the Transactions of the New Zealand Institute.—Shaw (J.), Changes in the Habits of Animals. (Nature, vol. iv., p. 506.)—Wharton (Henry T.), On a Parrot performing a Surgical Operation on Living Sheep. (Zoologist, 3rd S., vol. iv., 1880, p. 57.)—Wood (John, F.R.S.) On the Colon of a Sheep in which Colotomy had been performed by a Parrot. (Lancet for 1879, pp. 692 and 749.)—Yates (George C., F.S.A.), Notes on a Carnivorous Parrot. (Manchester City News, March, 1882.)

The Crow in India.

There is a bit of folk-lore about the crow in Dr. Fallon's Hindustani-English dictionary. (Benares: Lazarus and Co., 1880). The *Athenæum* says that "under *kavvá*, 'a crow,' we learn that if a crow hops to another place or flies away when it is addressed, this is an omen that an expected husband, letter, &c., will soon arrive; and Dr. Fallon quotes a curious woman's song:—

Fly, fly away, crow news of my brother's coming bring;
If he comes home some milk and rice 'fore you I'll fling,
My dress I'll tear and make for you a covering!"

Is this superstition known here at all?—X.

THE OBSERVATION OF PERIODICAL PHENOMENA.

THE observation of phenological phenomena is one of the first functions of the field naturalist, and one of the most fascinating of pursuits for the scientific student. The following list, recommended by the Phenological Committee of the Meteorological Society, has been adopted by the Hertfordshire Natural History Society and other good observers. The reporter on this subject to the Meteorological Society is the Rev. T. A. Preston, M.A., The Green, Marlborough, Wilts, by whom the list was drawn up.

All observations will be welcomed by him for use in his annual report. In this case the actual specimens of plants should accompany the report.

PLANTS.

1. ANEMONE NEMOROSA (Wood Anemone)
2. RANUNCULUS FICARIA (Pilewort—Lesser Celandine).
3. *Ranunculus acris* (Upright Crowfoot).
4. CALTHA PALUSTRIS (Marsh Marigold).
5. *Papaver Rhœas* (Red Poppy).
6. *Cardamine hirsuta* (Hairy Bittercress).
7. *Cardamine pratensis* (Cuckoo-flower—Lady's Smock).
8. *Draba verna* (Whitlow Grass).
9. *Viola odorata* (Sweet Violet).
10. *Polygala vulgaris* (Milkwort).
11. *Lychnis Flos-cuculi* (Ragged Robin).
12. *Stellaria Holostea* (Greater Stitchwort).
13. MALVA SYLVESTRIS (Common Mallow).
14. *Hypericum tetrapterum* (Square St. John's wort).
15. *Hypericum pulchrum* (Upright St. John's wort).
16. GERANIUM ROBERTIANUM (Herb Robert—Stinking Cranesbill).
17. TRIFOLIUM REPENS (Dutch Clover).
18. *Lotus corniculatus* (Bird's-foot Trefoil).
19. *Vicia Cracca* (Tufted Vetch).
20. *Vicia sepium* (Bush Vetch).
21. *Lathyrus pratensis* (Meadow Vetchling—Meadow Pea).
22. PRUNUS SPINOSA (Sloe—Blackthorn).
23. *Spiræa Ulmaria* (Meadow Sweet),
24. *Potentilla anserina* (Silver Weed).
25. *Potentilla Fragriastram* (Barren Strawberry).
26. *Rosa Canina* (Dog Rose).
27. *Epilobium hirsutum* (Great Hairy Willow-herb).
28. *Epilobium montanum* (Broad Willow-herb).
29. *Angelica sylvestris* (Wild Angelica).
30. *Anthriscus sylvestris* (Wild Chervil—Cow Parsley).
31. HEDERA HELIX (Ivy).
32. *Galium Aparine* (Cleavers Goose-Grass).
33. *Galium verum* (Yellow Bedstraw).
34. *Dipsacus sylvestris* (Common Teasel).
35. *Scabiosa succisa* (Devil's bit),
36. *Petasites vulgaris* (Butter-bur).
37. TUSSILAGO FARFARA (Coltsfoot).
38. ACHILLEA MILLEFOLIUM (Milfoil—Yarrow).
39. *Chrysanthemum Leucanthemum* (Ox-eye Daisy—Dog Daisy)
40. *Artemisia vulgaris* (Mugwort).
41. *Senecio Jacobæa* (Ragwort).
42. CENTAUREA NIGRA (Black Knapweed—Hardheads).
43. *Carduus lanceolatus* (Spear Thistle).
44. *Carduus arvensis* (Field Thistle).
45. *Sonchus arvensis* (Corn Sow-thistle).
46. *Hieracium Pilosella* (Mouse-ear Hawkweed).
47. CAMPANULA ROTUNDIFOLIA (Hair-bell).
48. *Gentiana Amarella* (Autumn Gentian).
49. CONVOLVULUS SEPIUM (Greater Bindweed).
50. *Symphytum officinale* (Comfrey).
51. *Pedicularis sylvatica* (Red Rattle).
52. *Veronica Chamædrys* (Germander Speedwell).
53. *Veronica hederifolia* (Ivy-leaved Speedwell).
54. *Mentha aquatica* (Water Mint).
55. *Thymus Serpyllum* (Wild Thyme).
56. *Prunella vulgaris* (Self-heal).
57. *Nepeta Glechoma* (Ground Ivy)
58. *Galeopsis Tetrahit* (Hemp-nettle).
59. *Stachys sylvatica* (Hedge Woundwort).
60. *Ajuga reptans* (Creeping Bugle).
61. PRIMULA VERIS (Cowslip).
62. *Plantago lanceolata* (Ribwort Plantain).
63. *Mercurialis perennis* (Dog's Mercury).
64. *Ulmus montana* (Wych Elm).
65. *Salix caprea* (Great Sallow—English Palm).
66. *Corylus Avellana* (Hazel).
67. *Orchis maculata* (Spotted Orchis).
68. *Iris Pseudacorus* (Yellow Iris—Flag).
69. *Narcissus Pseudo-narcissus* (Daffodil).
70. *Galanthus nivalis* (Snowdrop).
71. *Endymion nutans* (Blue-bell).

INSECTS.

72. *Melolontha vulgaris* (Cock-chafer).
73. *Rhizotrogus solstitialis* (Fern-chafer).
74. *Apis mellifica* (Honey Bee).
75. *Pieris Brassicæ* (Large white Cabbage-Butterfly).
76. *Pieris Rapæ* (Small white Cabbage-Butterfly).
77. *Epinephile Janira* (Meadow-brown Butterfly).
78. *Bibio Marci* (St. Mark's Fly).
79. *Trichocera hiemalis* (Winter Gnat).

BIRDS.

80. *Strix Aluco* (Brown, or Tawny, Owl).
81. *Muscicapa grisola* (Flycatcher).
82. *Turdus musicus* (Song Thrush).
83. *Turdus pilaris* (Fieldfare).
84. *Daulias Luscinia* (Nightingale).
85. *Saxicola Œnanthe* (Wheatear).
86. *Phylloscopus Trochilus* (Willow Wren).

87. *Phylloscopus collybita* (Chiff-chaff).
88. *Alauda arvensis* (Sky-lark).
89. *Fringilla cœlebs* (Chaffinch).
90. *Corvus frugilegus* (Rook).
91. *Cuculus canorus* (Cuckoo).
92. *Hirundo rustica* (Swallow).
93. *Cypselus Apus* (Swift).
94. *Columba Turtur* (Turtle-dove).
95. *Perdix cinera* (Partridge).
96. *Scolopax Rusticola* (Woodcock).

AMPHIBIAN.

97. *Rana temporaria* (Common Frog).

The names of species printed in capitals are those upon which observations are particularly desired. T.E.E.

A Coin in the Flesh of a Horse.

A curious story is told by the *Jamestown Journal*, of February 16, 1882, which states that on the day before the date Dr. Bender made an incision into the left shoulder of a fine horse belonging to Mr. H. Hess, the superintendent of Street Service in the introduction of our water-works system, and removed a silver ten-cent piece of 1876, which was placed there about four years ago by the man from whom Mr. Hess bought the horse in Kentucky. It was intended as a private mark, and was placed just beneath the skin, but considerable tissue had formed over it during its four years' lodgment. It was a well-preserved piece when slipped under the skin, and the only mark it retains of the singular service to which it was put is a greasy substance which adheres closely to the depressions in the coin.

The Heat in Silver Mines.

The *Virginia Enterprise*, a Nevada paper, has the following:—"If there are to be found anywhere in the world a set of human salamanders we may claim the credit of having them here on the Comstock. What would scorch a man who lives wholly on the surface chills a miner inured to the heat of the lower levels. A miner who has been for some months past working in one of the hottest sections of the Comstock, a day or two since gave an *Enterprise* reporter his experience of the heat which miners are often called upon to encounter. He says that in working at points where the thermometer marks a temperature of 115 to 120 degrees great thirst is experienced. No ice-water is too cold to be swallowed with a relish. Men go to the water barrel, in which huge chunks of ice are floating about, and will take their picks and chop the ice in order that the water may be rendered colder by being filled with fine fragments. Often this does not satisfy them, and they chew and swallow lumps of ice. The natural temperature of the human body is about 98 degrees, Fahrenheit. Therefore when a man remains in a hot place for an hour, or even half an hour, his blood and his whole body become heated to a temperature of 115 to 120 degrees, or whatever may be the temperature of the place in which he is at work. It is then that the miner begins to pour down ice-water and eat ice. The strangest thing about the business is that it does not hurt any of the men. Often they swallow such quantities of ice-water that their stomachs will not retain it, and in vomiting it up it will feel cold in their mouths and against their teeth. All they do on such occasions is to swallow more of the same water, but more cautiously.

Fight with an Ostrich.

Mr. W. Edmeades, an ostrich farmer at the Cape, has had an exciting fight with a cock ostrich. Mr. Edmeades' confidence in one of his birds was so great that he ventured into the camp with a large branch of a tree. No sooner did the ostrich espy the branch when he "made for" the man on the other side, and succeeded in cannoning him on the back. The scene, as described by an eye-witness, was truly appalling. The ostrich's ambition was to strip or kill his opponent, and Mr. Edmeades' object was to save his own life and his clothes, as well as the life of the bird. The two closed in what appeared to be mortal combat, The ostrich hissed and kicked; the man, who was hatless, with clenched teeth and determined look grasped his assailant around his plumaged waist, and with one mighty heave succeeded in bringing his opponent to the ground, and then, with great presence of mind and remarkable dexterity, seized the breathless bird by his serpentine neck, and after sundry efforts succeeded in twisting daylight out of his malignant eyes. Having now completely floored his assailant, tattered and torn from top to bottom, Mr. Edmeades sped for the nearest gap in the adjoining hedge, leaving the ostrich to reflect on the direful consequences of his pugnacious behaviour.—*Oudtshoorn Courant.*

A VISIT TO A LANCASHIRE HERONRY.

BY R. STANDEN.

PERHAPS there are few sights that afford a greater pleasure to a naturalist than that experienced from his first visit to a populous heronry during the breeding season. Such a visit, the remembrance of which will long remain impressed upon the writer's memory, was paid, in the beginning of April, 1870, to one of the few heronries now remaining in this county; and which is situate in close proximity to Claughton Hall, the residence of T. F. Brockholes, Esq., and not far from Brock Station, on the line from Preston to Lancaster.

The picture presented by the heronry at Claughton, during my visit, was one of the busiest activity. The nests, which are composed of sticks and lined with wool, were of large size, and placed on the topmost branches of some enormous old willow trees growing in a kind of swamp formed by a cutting or arm of the canal which runs close by. So near the house were they that the old "squire" could watch his favourites from his bedroom window. Proud indeed he was of his heronry, and jealously he guarded and protected it from molestation. I was privileged to be allowed to view the heronry, but although I would fain have climbed to the nests, and examined them more closely, and carried away a few of the eggs as a prize for my cabinet, I had to be contented with "look, but touch not." As one of the old keepers said, "you might as well ask the old gentleman for one of his teeth, as a heron's egg."

As I sat upon a fallen tree, and gazed upon the busy scene, my thoughts wandered away far back to the olden time when these stately birds were noble game. That was before the axe had felled our forests, and our meres and swamps were drained. Then, the clumsy crossbow and bolt supplied the place of the fowling piece, and the noble sport of falconry flourished in all its glory, and every gentleman, according to his rank, carried on his wrist the hooded falcon, or the short-winged hawk. Then, the cruel Forest Laws were in full force, and woe to the unfortunate serf, if he presumed to take the eggs of heron or hawk, or dared to injure or molest them in any way! It was far easier for him to obtain pardon for homicide than for such an offence as this! But since then the times have changed, and the disappearance of our forests, and the draining of the marshes, has driven from this country many birds such as the crane, spoonbill, and bittern, which were once quite common. The heron still maintains its ground—but not without protection.

The herons return to their breeding place early in February, having during the winter been scattered over the country, frequenting the mouths of rivers, and open sheets of water—often at long distances away. The eggs, which are about the size of those of the common barn door fowl, four or five in number, and of an uniform pale green colour, very round in form, are laid early in March, and when I was there most of the young ones were hatched. Whilst the female is incubating, the male stands motionless as a statue on a neighbouring branch, but morning and evening wends his way to some stream or pond in the surrounding country, and returns with a supply of food for his patient mate.

It was very amusing to witness the commotion in the heronry, especially towards evening. There was a general hurrying to and fro, clattering of bills and a continuous clanking chatter; and first one and then another rose on bouyant wing, bent their long necks until the spear-shaped beak projected from between the shoulders—like a tilting lance in rest, and with legs extended backwards, soared, with an easy graceful flight, into mid-air, and swept away in a straight line until lost in the distance. Others were returning well laden with their fishy prey, a loud "clank clank" proclaiming their approach. At first sight one would think their immense wings were out of all

proportion; but great wing power is requisite to enable them to carry home their heavy loads of food. Most comical were their efforts to obtain a footing on one of the topmost branches, as after an uneasy swaying motion of the body, they at last succeeded in steadying themselves. Then hopping on to the edge of the nest, they distributed their burden to their expectant family.

Locally, the heron is called "crane" or "long-neck," the latter being very appropriate. A commonly-believed notion in this locality is, that the "long-neck," whilst sitting, has her legs dangling through the sticks which form the nest; and that only two eggs, each as large as that of a goose, are laid, and the mother bird sits with one under each wing.

The food of the heron is various, consisting of fish of any kind, water rats, and young aquatic birds. They will strike at the largest fish, or indeed any moving object in the water that may attract their attention. I have found large roach pierced through by a stroke of the heron's beak, which had been too large to carry away. The keeper told me he often found eels lying on the ground, which had wriggled their way through the nests, after being deposited there by the herons. Speaking of their fish-destroying propensities, he said that the "squire" once had sixty pairs of tench sent to him as a present, and ordered a pond not far from the heronry to be stocked with them. The day following the herons somehow discovered the "good things" so near home, and never left the pond whilst a tench remained in it. One I shot, some years ago, had in its stomach five roach varying from two to four and a half inches in length; an eel nine inches long; a young waterhen; two young water-rats; and a heterogenous mass, the size of my fist, composed of hair and bones of, apparently, water-rats.

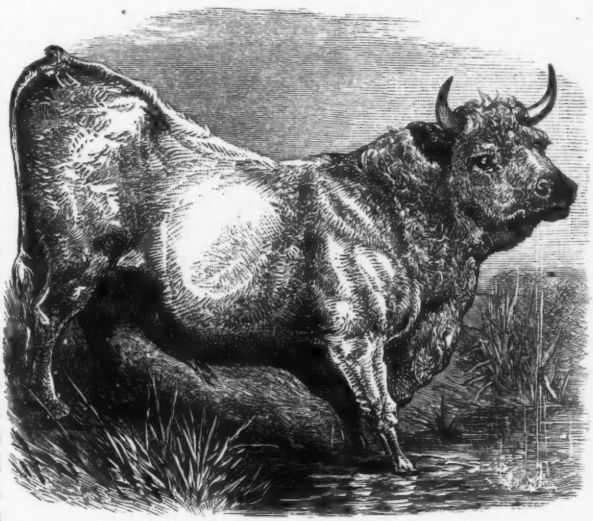
I regret to have to say, in conclusion, that this heronry is now a thing of the past. The old squire, their friend and protector, is dead, and his successor having, I am told, more regard for fish than for fish-destroyers, ordered the heronry to be destroyed. The venerable willows where the herons had dwelt undisturbed for so many years are cut down, and the poor birds themselves shot or driven away. Very seldom is one seen now. A pair did try to settle in a large tree on the banks of the Ribble, not far from Ribchester, but their nest was plundered by some lads from the neighbouring college at Alston. I am sure Lancashire ornithologists will be sorry to hear of the destruction of this heronry—for, apart from its interest to a true lover of nature, a heronry is a greatly to be coveted ornament to any gentleman's park.

Cryptogamic Vegetation in Feeding Bottles.

There are some curious habitats known to the botanist, but it may be doubted whether even a cryptogamist would think of the teats of feeding bottles as a promising field in which to gather specimens. It appears, however, from a communication made to the Paris Academy of Sciences by M. H. Fauvel, that the *biberons* used by babies who have the misfortune to be brought up "by hand" are not so devoid of botanical interest as might have been expected, and, it may be added, as might have been hoped. These tubes are of vulcanised caoutchouc, and sometimes have a peculiar and unpleasant smell. There is considerable difficulty in keeping them clean, and the milk becomes coagulated and acidulated. Some teats of this kind used in one of the day nurseries of Paris were examined by M. H. Fauvel. The milk and the tubes were alike infected by numerous and lively bacteria, and in the *ampoule* of the teat was a mass of cryptogamic vegetation, which became ovoid cells and developed in myceliums. Out of 31 examined, 18 of the caoutchouc tubes contained cryptogams, which were found even in those that had been carefully cleaned and were ready for use. The particular species of the cryptogamia have not yet been identified, and the subject may be commended to the attention of microscopists. It is very evident that the presence of these animal and vegetable ferments must have a deleterious influence on the health of the children. M. D. E. M.

BRITISH ANIMALS RECENTLY EXTINCT.*

THE great change which within the historic period has come over great tracts of British land are well indicated by this interesting book, in which Mr. Harting gives chapter and verse as to the former prevalence of the bear, the beaver, the rein-deer, the wild boar, and the wolf in these islands. The wild white cattle are not even yet quite extinct. With the advance of civilization forests have disappeared, and the animals that once dwelt in them have been exterminated. The changed surroundings have been too strong for the animals chronicled by Mr. Harting, and there are other species which, probably at no distant date, will need a historian as learned and sympathetic as he has proved himself to be.



WILD WHITE CATTLE.

The remains of the brown bear have been found in recent formations, and there are allusions to it not only in the ancient laws of Wales, but also in writings of Saxon and of Norman times. Mr. Harting thinks that the bears used by the gleemen in their performances were native animals that had been captured whilst young, and tamed. The brutal sport of bear-baiting remained common until quite recently.

The beaver is mentioned in the laws of Howel Dha, but was even in the tenth century a rare animal, since its skin was valued at 120 pence, whilst that of an otter fetched but eightpence. Remains have been found in a semi-fossil condition in Cambridgeshire and other localities. The Marquis of Bute is now attempting to re-introduce these creatures in Scotland.

The reindeer was once abundant in Britain. Prof. Dawkins has found its remains in thirteen out of twenty-one caverns of the past glacial period examined by him. The jarls of Orkney are said to have hunted the reindeer in the twelfth century in Caithness.

The wild boar is figured on some of the ancient British coins, and was hunted down to the Stuart times. In names of places, in legends, chronicles, pictures, and carvings, this redoubtable beast has left abundant and enduring marks.

There is scarcely a county in England in which the wolf did not at one time or other abound, and in Scotland and Ireland they were possibly still more numerous. It will be remembered that the legendary founder of Bath is said to have proved its water of healing force in the cure of wounds incurred whilst wolf-hunting. Our Saxon fathers styled the cold days of January the "wolf-month." The tribute of Wales to

*British Animals extinct within historic times, with some account of British Wild White Cattle, by James Edmund Harting, F.L.S., F.Z.S. (London: Trübner & Co.)

Edgar was 300 wolf-skins. Wolf-hunting appears to have been common in Northamptonshire in the thirteenth century, but the animal probably became extinct in England in the time of Henry VII., though it continued longer in Scotland and Ireland. It appears probable that there were wolves in Kildare as late as 1721.

The few remaining "wild white cattle" naturally form part of Mr. Harting's plan, since they may be regarded as a connecting link between the wild animals that have become extinct in this historic period and those which may still be classed amongst our *ferœ naturæ*. The remains of the *urus* have been found contemporaneous with Neolithic man. Skulls of *Bos primigenius* are recorded for Essex, Perthshire, Fifeshire, Lancashire, &c. *Bos longifrons* seems to have been a plentiful article of food in the Neolithic age. Wild cattle, forest bulls, white bulls are not infrequently mentioned in mediaeval records. These wild cattle still exist at Chartley Park, Staffordshire; Chillingham Castle, Northumberland; Kilmory House, Argyleshire; Lyme Park, Cheshire; and Somerford Park, Cheshire.

In this rapid review we have done scant justice to Mr. Harting, who has brought together under each head a large amount of illustrative matter, and has subjected the matter so industriously collected to severe and critical examination. There are some points in the history of the wild cattle of Whalley, Middleton and Gisburn that need further elucidation, if the data still exists for clearing up the obscurer parts of their history. Mr. Harting has produced a book which, whilst of special interest to the naturalist, should also have a fascination for the general reader. The least imaginative must be impressed by this story of the warfare of man against the denizens of the forest, of the struggle by which the advances of agriculture and civilization has driven them further and further away, "until finding nowhere to rest in peace, the bear, the beaver, the reindeer, the wild boar, and the wolf have become in Britain amongst the things that were."

The efforts of the author have been well seconded by the printer. Of the charming illustrations we are permitted to offer a specimen. The book can be cordially commended.

A.

The Nightingale in Lancashire.

I have read with great interest the paper on "The Topographical Distribution of the Nightingale in Great Britain," by Mr. Ernest C. A. Axon, in the June number of this Journal, and I am sure Lancashire ornithologists will be pleased to hear of any well authenticated cases of this sweet songster's appearance in the county. I have heard it in this locality on two occasions—at Samlesbury, near Preston, in June, 1864 or 1865 (I am sorry I cannot be exact as to date, but at that time I had not learnt to keep a diary), and also about a quarter of a mile from Goosnargh, near Whittingham Hall, in June, 1871. Many places round about Samlesbury are particularly well suited as a habitat for the nightingale. Readers of this Journal will doubtless remember well the attention the advent of this rare visitor excited. "Crowds" of people, from considerable distances, proceeded regularly every favourable evening to hear it 'discourse sweet music." At that time I was residing with an uncle at Walton-le-Dale, and on one occasion went with him to hear it, accompanied by a friend who had resided some time in Hampshire, and to whom the nightingale was quite familiar. He was rather sceptical at first, until the unmistakeable "jug, jug" of the bird was heard, and it trilled out its delicious notes; and he then exclaimed, "Yes, that is the genuine article!" Of course the bird received a due share of attention in the local papers.

In the instance where it occurred near my own home I had more favourable opportunities for observing it. It made its first appearance in the avenue leading up to Whittingham Hall, a place at that time very quiet, and seldom disturbed by passers bye. A dense growth of briars and shrubby plants afforded the bird the requisite shelter demanded by its

shy and retiring habits, and adjoining plantations also gave the same facilities for concealment. Night after night the villagers turned out *en masse* to listen to the wonderful singer, now heard for the first time by, I may say, all of them. The nights were lovely, and we stood, enchanted listeners, heedless of the flight of time, until the sudden cessation of the melodious strains would induce us to turn our steps unwillingly homewards, often turning to listen for the song to recommence. It stayed and sang with us for nearly a fortnight, and I was in hopes it would remain to breed; but, to my great regret, it suddenly ceased to be heard, and it was conjectured, not improbably, that it was driven away by an attempt made by the village lads to capture it. A few days after its song ceased here; it was heard, for two or three nights, at a place about two miles away, called Barton Cross.

I have been acquainted with the sedge-warbler from childhood, and have often heard it singing away most vigorously all night through, when I have been out "sugaring" for moths. It is one of the commonest warblers with us, and may be heard rattling off its merry notes by almost every pond-side or briary thicket on a calm evening. Now and then, I have heard one that greatly excelled its fellows in its powers of song, and really sang well, but, most certainly, no sedge-warbler's song that I ever heard was anything like the ravishing "bird music" I heard on these two occasions.

Goosnargh. R. STANDEN.

The Topographical Distribution of the Nightingale.

I have just cut the following from our local newspaper:—This interesting bird, of whom so much has been written, both in prose and poetry, is more uncommon than rare in and surrounding Norwood, and any one who gets out of his bed early enough may hear it in the following places:—in the Sydenham woods several are nesting, and their delicious trill may be heard in the morning before the bustle of the day sets in; one pair, at least, in the woods near the end of Church-road; and at Elmer's End, beyond the railway arch, is a favourite resort for them. Here more than one may be heard at the same time. The plumage of the nightingale is most sombre and chaste, varying from a soft brown on the back to almost a pure white beneath. This bird is most highly prized by the German canary breeders, for they make him the music master for their young birds, and a good Hartz Mountain canary brought up under him will trill almost in exact imitation of his rich, wild notes. The nightingale thrives well in a cage, but requires great attention both to his diet and cleanliness. If he is the least bit neglected he soon sickens and dies.—EDWIN MIERS. Lower Norwood, 10th June.

A correspondent of the *Manchester Guardian*, 20th June, says that "he was told by an ornithologist in North Lancashire that a few years ago the nightingale was heard at a place some half dozen miles north of Preston." This, if correct, will add another county to those mentioned on p. 18.—C.S.

Dispersal of Fresh Water Bivalves.

As supplementary to the interesting anecdote of the late lamented Charles Darwin, in your first number, it may be further interesting to your readers to know that only two or three weeks before his death he (Mr. Darwin) wrote a letter on the subject of the Dispersal of Fresh Water Bivalves, in which he relates an instance, which occurred some years ago, of a *Unio* being found attached to the tip of the middle toe of a duck shot on the wing, as well as other important facts of the same kind. W. MAWER.

Ranunculus Acris without Stamens.

I should be glad to know if any of your readers have noticed specimens of *Ranunculus Acris*, in which the stamens are conspicuous by their absence. I have met with a great many this spring, and have friends whose attention I have drawn to the circumstance. As there does not seem to be any reference to it in either floras or botanical text-books, perhaps you will kindly mention it in your next issue. Specimens of *Nepeta Glechoma* (but only from one locality) were in the same destitute state.—H. SEATON EDWARDS, Liverpool.

Knitbane a local name for the Symphytum tuberosum.

This herb has some medicinal repute among the vulgar. Britten and Holland say that it is called "Comfer Knitbeen" in Aberdeenshire, where the root boiled in oil is "extolled by old women for hardening and strengthening fractures." They are not apparently aware that its Lancashire name is Knitbone.—X.

Our Study Table.

A List of British Birds (*John Van Voorst*).—This little book still holds its useful place amongst the handy books for the ornithologist. The genera are arranged according to Sundevall's method, with the nomenclature revised by Mr. H. T. Wharton, M.A., F.Z.S.

Country Rambles and Manchester Walks and Wild Flowers. By *Leo H. Grindon*. (Manchester: Palmer & Howe).—The scientific students and field naturalists of Lancashire will give a warm welcome to this book, which consists of a partial reprint of the author's "Manchester Walks," with additional matter. It now forms a pleasant and profitable guide for rural wanderings in Cheshire, Lancashire, Derbyshire, and Yorkshire.

Second and third instalments of American Ornithological Bibliography. By *Dr. Elliott Coues*, U.S.A. (Extracted from the "Bulletin of the Survey.") The first part of this great undertaking of Dr. Coues appeared in the appendix of "The Birds of the Colorado Valley," and by successive instalments the author hopes to accomplish a universal ornithological bibliography. We need scarcely say that we wish him all success. After a very careful examination of his work, we are convinced that the task could not have been undertaken by one more competent or more painstaking. The amount of labour involved in the preparation of the parts which have already appeared, is great enough to have daunted all but one of the most vigorous enthusiasm and courage. The first part dealt with North American ornithology. The second contains the titles of Faunal publications relating to the birds of the rest of America. These two instalments the author informs us are all that he is at present prepared to publish relating to regional ornithology. The third part takes up an entirely different ground, and gives the titles of publications, that is, books, pamphlets, articles in magazines, and even in newspapers, treating of particular species, genera or families of birds. These titles are systematically arranged under the names of the families, in the alphabetical order of the author's names, placed under the dates when they were published. When dealing with exclusively American species, Dr. Coues gives all the titles he possesses. But of the more cosmopolitan birds he presents only a selection. The result is a work which will command at once the admiration equally of the ornithologist and the bibliographer. For the most part the books are described from actual examination, and where this has not been the case, Dr. Coues is very careful to inform us of the fact. The immense labour involved in the preparation of such a list can only be fully appreciated by those who have had some practical experience of the toils and difficulties of bibliographical research. The portions which have already appeared of Dr. Coues' bibliography are so excellent in their quality that we can only trust he may have strength and energy left to complete this great work.

A History of British Ferns. By *Edward Newman*. Fifth or People's Edition. (London: Sonnenschien & Allen.) This book having taken its place amongst the classics of botany, it is quite unnecessary to speak of its merits. All that is requisite is to commend this cheap and handy re-issue to the notice of all lovers of ferns. They will find in its text, plates and glossary full descriptions and directions for finding, drying, distinguishing, and cultivating every British fern.

Jottings on some Objects of Interest in the Stonehenge Excursion. By *E. T. Stevens*. (Salisbury, Brown & Co.)—This is a pleasant gossiping guide, which may with safety be recommended to those contemplating the Stonehenge excursion. The author chats pleasantly of hour-glasses, stone implements, primitive ideas of the soul, tobacco-pipes, and many other curious topics that crop up naturally in the course of the ramble. These matters are further elucidated by 95 woodcuts. The Great Bustard once made its home on the great plain of Salisbury, but its last appearance there, as recorded by Mr. Stevens, was in 1871. The incessant persecution to which it has been subjected will soon relegate this interesting bird to the extinct fauna of England. "Most true it is, and pity 'tis 'tis true."

Vignettes from Nature. By *Grant Allen*. (London: Chatto & Windus).—We would recommend this volume as the most delightful one the budding naturalist can take away with him for his holiday reading. The subjects treated are such as the Campion, Loosestrife, Pimpernel, the Hedgehog, or the Carp; and these common objects, and a host of others, have a story given to them, which he who reads will not forget; while he who remembers it will have opened to him a fresh interest in life. The key-note to the book is to be found in the following paragraph:—"Facts of distribution like these were utterly meaningless before we obtained the key of evolutionism; but, with that key to open their meaning, and they become at once speaking evidence as to the former migrations and relative descent of the whole group of creatures to which they refer."

TO CORRESPONDENTS.

We regret that it is not possible to register the *Field Naturalist* as a newspaper. The Post Office authorities decline to class it as such, and also point out that the fact of its being issued at intervals longer than seven days, removes it from the class of publications on which the cost of Inland Postage is reduced.

THE GREAT-CRESTED GREBE IN CHESHIRE.

BY FRANCIS NICHOLSON, F.Z.S.

THE great-crested, tippet, or satin grebe (*Podiceps cristatus*) as it is variously called, is the largest of its genus. It is not numerous as a species anywhere, inhabiting chiefly fresh water, but also occurring on the sea, and especially in estuaries during the winter. The grebes are the only ones of the family whose habits lead them to pass comparatively peaceful lives, on the less agitated surfaces of our inland lakes and meres; the others being more or less sea birds, whose dwelling-place, when on land, is on wild rocks, exposed to storm and tempest, of which they take no heed, defended as they are by a rich coat of glossy plumage, whose smooth and oily surface is impenetrable to water.

Thanks to the protection afforded to this splendid bird, through its frequenting private waters, principally on the meres of Cheshire and Shropshire, it has not come to be spoken of yet in the past tense, for it breeds regularly on most of them; and sometimes two or three pairs may be seen at one time. It has certainly not decreased in number for the last few years, and with the shelter extended to it by the owners of the waters, and the beneficial restrictions imposed by the Gun Tax and Sea Birds' Protection Act, there is hope that it may long remain to gladden the eyes of the fortunate beholder. Beautiful as this bird appears when skilfully mounted, no conception can be formed of its grand appearance when seen through a good glass on its native waters, as it rises on a sunshiny day from its lengthened dive, looks round, shakes the drops from its neck, and then plunges again unwearied. Where not molested it is by no means a shy bird. The grebe floats lightly, but can sink on occasion, so as to present to view only the neck and head. Its size and beauty, its agility in diving, render it most interesting.

Any observer of the habits of birds, who has the opportunity, and is in the neighbourhood of one of our Cheshire meres, may be recommended to provide himself with a first-class telescope or field glass, — which no ornithologist should be without—and he will be amply repaid for his trouble. No difficulty will be found in recognising this remarkable looking bird, which can easily be identified by the crest on the crown of the head, and the tippet or ruff on the sides or upper part of the neck. The bird has the power of moving this sort of shawl or tippet round its neck, as well as the two tufts or crests on its head, which, when erected, appear like two horns.

On the larger reservoirs in Lancashire specimens of this grebe are seen almost every winter. These settle down for a time, in passing, no doubt, to and from their breeding haunts to the sea. In hard winters they forsake the fresh water lakes, being frozen out, returning with the first mild weather, but in some mild winters many never forsake their inland retreats, but continue residential the whole year. The under surface of the body is covered with feathers of a beautifully soft and silky nature (hence the name satin grebe), which are valuable for making muffs and trimming ladies' jackets.

They are unsocial, solitary birds, not consorting with other wild fowl, and seldom more than a pair being seen together. It requires all the address and skill of a keen sportsman to shoot one, though the inexperienced may think otherwise, when he sees one of them apparently dozing within a few yards of the rushy confines of a pool of water. But the grebe is neither sleeping nor off his guard, as the gunner would know, were he near enough to watch the motions of the wary bird. He would then see its clear penetrating eye, glancing in every direction, alive to the approach of friend or foe, and if suspicious of danger, its body gradually sinking until the upper part of it only remains visible, and its sharp lance-shaped head thrown back on its

slender neck, prepared to plunge at a moment's notice. So rapid indeed are their movements, that, on seeing the flash of a gun, they can dive into security, below the water, before the shot can reach them. In the old flint-lock days it was almost impossible to shoot them, as they went down with the flash of the pan.

The Rev. Richard Lubbock, in his "Fauna of Norfolk," says—"The nest is often built in an exposed situation, before the young reed has sprouted sufficiently to conceal it, but weeds flung over the eggs render the whole so like a clot of decaying water plants, that it is not always easily discerned. Opinions have varied as to whether fermentation has aught to do with the warmth furnished to the eggs of this bird. The nest differs from the coot's in many particulars: it is composed of half rotten decaying water plants, is generally wet to the very eggs, and rises and falls freely as the water alters its level. The coot, on the contrary, always uses the driest rushes for her nest, and appears to add fresh layers, should the water rise greatly: her nest is also elevated a foot above the water, whilst the loon's (another name for this species) is nearly on a level with the element. When the nest is plundered, they immediately make another in the vicinity, and lay again freely. I have found three nests in one morning, in all of which the eggs were covered as here mentioned, and the old bird uniformly quitted the vicinity of the nest by diving. Her exit was only perceived by a vibratory motion of the reeds, like that caused by a pike moving off, when disturbed, but slower and more regular. She seldom rises within gunshot of the person who disturbs her, and if a boat be stationed to intercept her, will tack about, and vary her course under water." Mr. Lubbock also says "He would infer that this bird, like the cormorant, the gull, and some other piscivorous birds, is capable of a high state of domestication. They soon free themselves from fright at the sight of man, and once, whilst he was angling in a secluded corner of a broad, he was attended for an hour or two by a very young loon—the float of his line, the top of which was painted red, appeared to have a power of fascination. Several times called away by the voice of the old loon, which was close at hand, it entered the reeds and absented itself, and then returned to gaze at the boat, ourselves, and above all the vermilion cork before mentioned, venturing often within two yards of the boat. The fen-man who was with him said that he had before seen similar boldness and curiosity in the young of this bird."

The eggs are usually four in number, greenish white, but generally soiled to a yellowish white, and covered with dirt in the form of brown streaks and spots. They measure two inches two lines long, by one inch and six lines in breadth. The parent birds are very careful of their young; taking them down with them for security, under their wings when they dive. They feed them with young eels, and other small fish, and some crustacea, and portion of vegetable food. Tadpoles and small frogs are favourite diet with them.

Mr. Yarrell says that he never remembered to have examined internally examples of the great-crested grebe, the stomach of which did not contain a portion of feathers, which appeared to have been taken from the white under surface of their own bodies. This habit of swallowing feathers seems to be peculiar to the grebes only, but from fish bones being occasionally found mixed up with the feathers, there is cause to suspect these birds bring up at will from the stomach the more indigestible parts of their last meal, as hawks, owls, shrikes, and some other birds are known to do.

Erratum.

On page 25, column 1, line 15, for *unfavourable* read *unprocurable*.

DIFFERENCE BETWEEN VITAL AND PHYSICAL ACTION.*

BY PROFESSOR LIONEL BEALE, F.R.S.

I WOULD draw attention to the declaration again and again repeated, and now taught even to children, that the living and the non-living differ only in degree, that the living has been envolved by degrees from the non-living and the latter passes by gradations towards the former state. No one has adduced any evidence in proof of these conclusions, which are, in fact, dictatorial assertions only, and no specimen of any kind of matter which is actually passing from the non-living to the living state, or which can be shown to establish any connexion between these absolutely different conditions of matter, has been, or can be at this time, brought forward. Between purely vital and purely physical actions not the faintest analogy has been shown to exist. The living world is absolutely distinct from the non-living world, and, instead of being a necessary outcome of it, is, compared with the antiquity of matter, probably a very recent addition to it,—not, of course, an addition of mere transformed or modified matter and energy, but of transcendent power conferred on matter which controls, regulates and manages both matter and its forces according, it may be, to laws but not the laws of inert matter. It is not only one or two of these positions assumed by the materialists that are open to doubt or objection. Facts completely controvert all materialistic views which have been put forward. To be condemned as untenable the doctrine that there is a relationship between non-living and living matter, or that the term molecular mechanism can be applied to the former. The simple truth is, that the essential phenomena of all living beings cannot be explained without recourse to some hypothesis of power totally different from any of the known forms or modes of energy. Any one who allows his reason to be influenced by the facts of nature as at present discovered will feel obliged to admit the existence of vital power as distinct from, and capable of controlling, the ordinary forces of non-living matter. It has been conclusively shown that the laws of vital force or power are essentially different from those by which ordinary matter and its forces are governed. A Nature which was really blind, insatiable, irresistible fate, falsely called law, destitute of intelligence and reason, devoid of mercy and justice, is the Nature held up for our admiration, with the consoling assurance of dictatorial authority that it sprang from chaos in obedience to everlasting self-originating (?) law, and that it will return to chaos, in obedience to the same,—all life, and work, and thought being but the undulations of cosmic nebulosity, and dependent upon the never-ceasing gyrations of infinite, everlasting atoms as they bound through the ages from void to void. This, the dullest, the narrowest, the most superficial of all creeds,—materialism, which includes some mixture of antitheism and atheism of various forms and hues,—has been half accepted by hundreds of persons during the last few years. I believe all materialistic doctrines, vary as they may in detail, will be found to agree in accepting as a truth,—if indeed, they are not actually based on it,—the monstrous assumption that the living and the non-living are one, and that every living thing is just as much a machine as a watch, or a windmill, or a hydraulic apparatus. According to the material contention, everything owes its existence to the properties of the material particles out of which it is constructed. But is it not strange that it never seems have occurred to the materialistic devotee that neither the watch, nor the steam-engine, nor the windmill, nor the hydraulic apparatus, nor any other machine known to, or made by, any individual in this world, is dependent for its construction upon the properties of the material particles of the matter out of which its several parts have been constructed!

* From a paper recently read before the Victoria (Philosophical) Institute.

SOME LETTERS OF THE LATE PROFESSOR W. P. SCHIMPER.

WILHELM PHILIP SCHIMPER is known to all muscologists. His great work on European mosses, although but a small section of the work of his busy life, will always remain a monument of his industry and learning. He was born in 1808 and died in 1880. During a visit to England he made the personal acquaintance of Mr. William Wilson of Warrington, Dr. J. B. Wood of Manchester, and other bryologists. The following translations and excerpts from some of Schimper's letters will be read with interest. The first was addressed to Mr. William Wilson, the author of the "Bryologia Britannica."

22nd August, 1853.

My Dear and Excellent Friend,

Your rich and most interesting parcel reached me on the eve of my departure for our country place in Switzerland, where I am in the habit of passing my vacations with my people; and I have only just had time to run over the precious packet and admire its contents. You have really taken too much trouble for me, my dear friend, and when I think of the precious time that you have devoted in preparing this collection I do not know how to thank you. I have never received a parcel of which the contents interested me in so high a degree as your last, and for me it will be truly a piece of good fortune to study this collection in detail.

I have worked a good deal this year to advance the "Bryologia Europæa," that I might finish it up to *Sphagnum* and *Andreæa* before the new year; and these two last genera will be published at the latest next spring.

For many years I have been alone upon the field of battle, Bruch being dead, and Gümbel having been obliged to abandon the mosses on account of the bad state of his eyes, which has occasioned the loss of time.

The genus *Hypnum* has almost made me lose courage. I have left it and returned to it a thousand times, and in order to make myself master of it I have cut it in pieces. I have done like Alexander with the Gordian knot, and may I obtain the same success from the same operation? The critics have reproached me meanwhile with having increased the difficulties by creating too great a number of genera; and they are, perhaps, right. I do not know, however, if some few names, more or less, can add to the difficulties of a science. I regard as genera what you call sub-genera, and others again sub-divisions, or groups. The essential thing is to bring together like to like. This bringing together (*rapprochement*) may produce groups, and these groups may be called by proper names: each one is free to adopt these names or to reject them and be content with a diagnostic phrase for the group. This certainly is not simpler than a name. Time will prove which is right of these methods. In glancing over the many new hypna which you have sent me, I have said to myself: "I believe that I am not wrong in having done as I have done."

Where are you with the new edition of the "Muscologia Britannica"? I should very much like to see this work appear before the publication of my Synopsis.

Believe me ever to be, &c.,

W. P. SCHIMPER.

From letters addressed to Dr. Wood the following extracts are taken:—

Schimper writes on the 22nd Jan., 1877, a letter in which by way of apology for being a tardy correspondent, he says, "In all the week I can only reserve Sunday and Monday morning for microscopical researches, as all the other days of the week have to be devoted to giving lessons and to the work of the museum, which latter takes all my afternoons. Happily the days are beginning to lengthen. The *Bryum* from Southport which you thought might belong to *B. Cuspidatum*, is nothing more than a fine and luxuriant form of the *Bryum lacustre*! As to *Campylopus paradoxus* I should say that the seventeen specimens you sent me in September (which I return you) all belong to *C. flexuosus*, that is belong to the form which Wilson calls *C. paradoxus*, and which is distinguished by narrower leaves, which are stiffer when humid. The tufts are brown on the lower part, instead of russet as in the case of the *C. flexuosus*. But now that I have seen so many specimens, showing intermediate forms, I doubt if a specific difference between the two can be established. I leave the question undecided. The genus Campylopus is the *crux* of bryologists. Above all, when the samples are sterile it is often difficult for the enquirer to know if he is dealing with a Campylopus, a Dicranum, or a Dicranodontium. It is better to leave some things in doubt than to fall into error. We should always avoid creating a fresh species on the evidence of a single specimen, when it does not show very decisive characters, and above all when it is sterile.

You sent me with the name of *Hypnum alpestre* a moss gathered at Braemar, by Mr. Squire Ashton. It is the *Plagothecium denticulatum, var. condensatum.*

I have never myself collected the *Bryum funckii*, but I will send you some good specimens in my next package, which will contain the fine samples of the *Aspidium Holleri*, which we collected for you near Neuchâtel. When I go there in March I shall gather for you a good many specimens of *Barbula inclinata*, which we do not now find in winter."

On 21st August, 1878, Schimper writes :—

Couve, Canton Neuchatel, Switzerland.

My very dear Friend,

It seems an eternity since I heard news of you, and I really reproach myself because I believe it is my own fault. But my long silence is not a proof that I have forgotten you, for I have often thought of you with my old affection, but I have become a very bad correspondent, for in addition to my many occupations which often tire me very much, I have been frequently unwell, and this summer has been particularly bad for me. So, in order to have complete rest, we left Strasburg a month ago, and have settled in this beautiful valley of the Jura, where we shall remain until nearly the end of September. Rest, the fine mountain air, and the peacefulness of the beautiful scenery amidst which we live, have already done me much good, and I am hoping to have long walks, but without tiring myself too much. I can no longer scale the high mountains which once upon a time were so full of interest for me, from a bryological point of view. I have not yet been able to gather any mosses except the *Cinclidotus aquaticus*, which carpets the bed of the magnificent source of the Creuse, at the bottom of the valley. It is at this moment full of fruit and in the best condition. I have collected plentifully and will send you some if they will have any interest for you. I sent to Geheeb for you the specimens of *Hypnum crista castrensis*, which we collected for you last year at Villars. I don't know whether he has yet sent them on to you.

Now I cannot collect myself, and as my old stock is exhausted, my bryological correspondents have abandoned me, and I receive scarcely anything now.

Last June I had a visitor for a fortnight, Mr. T. P. James, of Boston, who is preparing with Leo. Lesquereux a "Synopsis Muscorum boreali-Americanum,"—a work which was contemplated by the lamented Sullivant. A series of species were submitted to my examination, which they had not been able, in America, to make out very clearly. I am desirous that the two bryologists should carry their work to a successful issue, but it is certainly necessary that they should make haste, for they are each 73 years old! It is true that they both look very vigorous, but their eyesight is beginning to fail, a vexatious circumstance in the study of mosses.

And now how are you and yours? I hope you will be able to make a satisfactory reply. Have you had any short journeys which have given you pleasure? Have you been able to lay hands on some fine moss, or received anything fresh from your correspondents? With your plenteous communications I have been able to satisfy the requests made to me from time to time for English mosses.

He writes, 23rd Dec., 1878, apologizing for delay and confessing that at nineteen days from his 73rd birthday, he finds these many years beginning to weigh upon him, so that he has had to relax in his onward march, and cannot work so easily as in former times, but is soon fatigued.

"The new work on Phytopaleontology which I have undertaken, and of which the first part should appear in the spring, takes every moment that is free, and our dear mosses suffer much from neglect. However, I have examined with much care your doubtful *Sphagnum*, but I cannot make it out to be anything different from *Sphagnum acutifolium*. It often happens that the plant is found only with male flowers, especially in autumn, but often also these plants have female flowers in the spring. Your plant for the rest belongs to the *Sphagnum rubellum*, Wils., which appears to be dioecious.

I am preparing for you a complete collection of our European *Sphagna*, with some exotics. I shall add a series of rare mosses, which I have received from Styria, and a certain number of specimens of *Barbula inclinata*, which I have asked for you, as I have not been able to gather any myself. The packet will also contain the mosses collected for you in the Val de Travers. It will be rather voluminous, but I cannot send it by letter post even if I divided, but you will have it in a few days by a slower method of communication.

My son Willy has passed his examination for the doctorate in a very brilliant fashion, and has received his degree "summa cum laude," an addition which is very rarely made. His printed thêse, "Sur la crystalloïdes du régne végétal" you will receive in the packet of mosses."

A letter dated 18th Jan., 1879, relating to a promised despatch of specimens, contains the following :—

I do not know if I have told you that the *Sphagnum acutifolium* is often found dioicous when the plants are young; that is to say, the plants begin by bearing only male flowers.

The following letter has already been printed, but will be fresh to many readers, and it has specially interest from the graphic picture it gives of the fine old naturalist at work to the last.

"Strasburg, Dec. 15th, 1879.

"My very dear Friend,

At the same moment that I was about to take up my pen to knock very gently at your door, and urgently to ask some tidings of you, of which I had been so long deprived, your excellent letter came to hand, which has caused me a pleasure so much the greater as it had been impatiently expected so long a time.

"I was happy to see that you had not forgotten your old friend in Strasburg, who so frequently thinks of you, and of the charming and happy days which he has passed in your society. Alas! these happy moments can never return, and pro-

bably we shall never see each other again; but I sincerely hope that our friendship may never diminish on that account, and that at the moment of our supreme separation, we may be able in spirit to grasp each other fervently by the hand, and mutually take a cordial and final farewell. In a few days I shall have attained the age of 72 years, and shall have thus arrived at that grand limit of life which separates a very long past from a very short future! During that time I have experienced both good and evil days: and in these latter days of the year, which invite us to retrospective and serious thoughts of that which has passed, with its numerous perplexities, joys, and sorrows, presented to our view, you feel your heart to be saddened at the contemplation of the numerous gaps which have occurred around you, in the irrevocable absence of those to whom you were bound by the most intimate and dearest ties.

"It is this which constitutes the greatest sorrow of old age, thus to find yourself in the midst of a world which is no longer yours, and from which the ancient figures and friends have disappeared—a world which has no longer any thought in common with you, and whose egotism and selfishness is thus made manifest, that so soon as you are not able to satisfy its demands or requirements you are at once forgotten. Even my poor mosses have felt this, and you also have realised the same thing in your own experience, when we can no longer give of our abundance to others from our inability to collect things for ourselves.

"Individually I receive nothing, or scarcely anything, from those who were my former correspondents. The only exception to this is in the case of my excellent friend Breidler, of Vienna, who has again recently sent to me the results of his last excursions on the higher Alps of Styria, but which have, unfortunately, not been so productive this year as formerly. My stay at Cannes, on account of the backward state of vegetation, the consequence of a very severe winter, has literally afforded me scarcely anything in the way of mosses, as I already have told you in my former letters. *Trichostomum flavo-virens* in immense quantities, and in the very highest state of perfection as regards fruit, was almost the only thing that was worth gathering.

"I have, however, still remaining a very large quantity of duplicates from the South of Europe, and from other localities, which, if it will afford you the least possible pleasure to receive and distribute amongst your friends those which you do not yourself require, I will send to you. I have already asked, at your request, from friends both in Sweden and Norway, for good specimens of *Barbula brevirostris*, but have only received a few, that are not very good, from Christiania, which I shall send to you hereafter. I am constantly receiving large parcels of mosses to examine and determine, the great part of which are, however, barren, which puts my patience to the proof, and causes me to lose much valuable time. If I must satisfy all these requirements, frequently very indiscreet and thoughtless, I must waste nearly all my time in examining mosses for others. An American has recently sent me some hundreds, a thorough and profound investigation of which would require many months, and in the meantime I have my own numerous occupations, which I cannot postpone or lay aside.

"The discovery of *Fissidens serrulatus* in England is a very important and interesting fact. It is another proof of the probable existence of a number of species in common with those of the South of Europe, as also with the Canary Islands.

"England, with its numerous isles, is the very Eldorado of mosses, participating as it does with the bryological flora of the North, of the South, and of the intermediate zone; and doubtless there remain many interesting discoveries to be yet made within its limits.

"For the last six weeks we have been living here in a climate altogether like that of Siberia. In the memory of man, never have there been known such heavy falls of snow, nor cold so excessive and persistent. We have already had—23° centigrade, and the temperature has been constantly ranging between—12° and—16°. We have consequently suffered much from this severe and rigorous weather. All the world appears to be labouring from an affection of the spleen. Towards the end of last summer, and the commencement of autumn, my health was not very good or my time a very pleasant one in consequence of the excessive heat, which fatigued and weakened me so very much as to render it impracticable for me to do any work. I went to seek some repose and rest for several weeks in a beautiful valley in the Vosges, situated in the midst of enormous pine forests. There were also there at the same time some English families who had come from England and from India, who were all delighted with the situation, and greatly enjoyed the locality and its scenery. They had been there from the previous May, and remained until the end of October.

"Cecile is to be married in March, but she will remain near me for at least a year, with her husband, who is a doctor of medicine, and who intends to establish himself probably in some other town in Alsace, where I shall in all likelihood follow them.

"I have already retired frem the duties of my Professorship at the University, and am now at liberty to do as I please.

"The sad accident which has befallen Mr. Curnow in breaking his leg has caused me much grief.

"Will you have the kindness to tell him when you write how sincerely I sympathise with him in his affliction and the suffering he has to endure.

"Adieu, dear friend! May the New Year upon which we are about to enter be a propitious and happy one, both for you and yours, to whom I beg you will present my most affectionate regards, and good wishes to all, and believe me to be from my heart, your old friend,

W. P. SCHIMPER.

To Dr. J. B. Wood, Manchester."

The end was near, for Schimper died on the 20th of March, 1880.

HOW ANIMALS BECAME CARNIVOROUS.

BY T. R. ALLINSON, L.R.C.P., ETC.

IN the scale of creation plants were developed first; they began as very low forms or may even all have sprung from one low form. As time went on they grew in number and variety. Some slight circumstance was sufficient to cause one to change its character, and it handed down its peculiar character to its offspring. In this way fresh varieties of plants were formed, and now we have an immense number of all sorts. Some are content to carpet the fields like the daisy, whilst others thrive best by shooting up into the air like buttercups, but each one has assumed its present shape by finding that it could so get on best. These changes were not made in a few years, but are the works of centuries, and if anyone could have watched them he could scarcely have been able to tell where a change began, so minute were the differences. After the plants had appeared—or almost at the same time—the lowest forms of animal life appeared and fed on the plants. These low forms of animal life had also to differentiate themselves by some stress of circumstance, and in time new kinds of animals were the result. Some insects were forced by stress of circumstances to feed on each other, they did this for some time; their organs changed in structure, and in time it became right for them to feed on carcases.

We see an everyday example of this in the midge; it sucks the blood of animals if it can get it, if not it feeds on the sweet juices of plants. The leech is also another example, it feeds on vegetable food in the pond in which it lives, but it will live on the blood of an animal if it can get it.

No doubt at one time animals were herbivorous, but some stress of circumstance made them feed on the bodies of one another until they developed certain peculiarities, and hereafter it was right for them to do so, and now they are called carnivorous animals. Let us instance many goats on an island, they increased in number until there were more goats than there was food for them—this is now a recognised law. Some died of starvation or in the fight for food; one was very hungry, and tearing off the skin it eat the flesh of its fallen kin. The flesh appeased its hunger, and when hungry it again returned to the carcase, and thus it went feeding on dead bodies. After a time it began to like flesh, and when it could not get dead bodies, then it killed its kind and fed on them. The offspring of this animal would tend to do the same, and since it has to fight for its living it has to grow new parts. Its teeth must change, its limbs must also change and the character of its stomach must alter. After a few centuries we find a different animal from the original goat; in fact, we have now a carnivorous animal. From this instance we see how changes may occur. Some one may say that goats could not be taught to eat flesh, but experiment has shown that goats and sheep, or any animal can be taught to eat flesh until it refuses its natural grass, hay or corn.

A change of this nature has been lately seen in New Zealand, In the memory of man the kea or *nestor notabilis* was a fruit-eating parrot. Sheep were introduced into New Zealand, some of them died, and the kea tearing off the skin, eat some of the flesh. It liked it, and began to feed on flesh only. Now, as dead sheep were not always to be had it attacked living sheep; killed them and fed on their bodies. The kea is now a carnivorous bird, and in consequence is killed wherever found.* Man himself has tried to be carnivorous or partly so. His original dwelling-place was in a hot country where he had fruit all the year round. He increased rapidly, and to find food emigrated to places where fruit was only ripe once a year, so that he could only live on it for about six months. In winter he killed animals for food, and found that by eating

* A full account of this extraordinary occurrence will be found in the *Field Naturalist*, p. 39.

their carcases he could live until the summer came round. He found hunting hard work, so he tamed the young of the cow and the sheep, and killed them when he wanted them. This has now gone on for ages, and man has began to think that a mixed diet suits him best. But for all his carnivorous practices he has not changed his nature yet; his teeth, tongue, stomach, length of intestine, flat nails and perspiring skin all point to his frugiverous character. That such is his nature seems beyond dispute, and that men can live without flesh food is now an everyday experience. There are hundreds of men now living in England who never eat meat from year's end to year's end, and they are as strong as other men and remarkably free from disease. Let readers ponder over this, try and live without meat, and they will soon come to the conclusion that man has no carnivorous traits.

Equine Revenge.

Carlyle told me a story of two horses, illustrative of the sense of humour in animals. I cannot date it either by day or year, and therefore I give it in a note. They had a vicious old sow, who was the tyrant and the terror of the farmyard. One day Carlyle was smoking his pipe outside his front door, when he heard shrieks of rage and agony combined from the back of the house. He went around to see what was the matter. A deep drain had been opened across the yard, the bottom of which was stiff clay. Into this by some unlucky curiosity the sow had been tempted to descend, and being there found a difficulty in getting out. The horses were loose. The pony saw the opportunity—the sow was struggling to extricate herself. The pony stood over her, and at each effort cuffed her back again with a stroke of the fore hoof. The sow was screaming more from fury than pain. Larry (the horse) stood by watching the performance and smiling approval, nodding his head every time that the beast was knocked back into the clay, with (as Carlyle declared) the most obvious and exquisite perception of the nature of the situation.—*Froude's Life of Carlyle.*

INCREASE IN WEIGHT OF THE OSTRICH.*

BY M. GEOFFROY SAINT-HILAIRE.

THERE is a great lack of exact information as to the increase in size and weight of animals, but some observations have been made at the Paris Jardin d'Acclimatation. Amongst these are curious particulars as to the ostrich. There came to the garden on the 30th June, 1879, with a convoy of Nubians, ten young ostriches weighing altogether 63 kilogrammes. In the month of August one of them died, and on the 5th of November following the nine survivors weighed 476 kilogrammes. The animals had increased their substance more than sevenfold, owing, probably, to the food they had absorbed and the influence of the hygienic conditions to which they had been subjected.

Nuts as a Charm.

An occasional correspondent of the *Times of India*, writing from Mahableshwur on May 5th, says:—

About a quarter of a mile below the cinchona plantation is the romantic valley to which many people go to see the Yenna waterfall. This is enjoyed best at the end of the rains and during the cold season, when the volume of water is said to be large and the sight magnificent. Here in this valley on the left bank of Yenna, as well as in Wai, there are very handsome trees of *Elococarpus Oblongus*, known here as *Kasoo*, which, when in full bloom, are very beautiful. They are now beginning to flower; the flowers being arranged in simple drooping racemes; calyx reddish brown and petals white, beautifully fringed. This tree is closely allied to *rudrach* (*Rudrach ganitrus*) also found here, the nuts of which are elegantly tubercled and used as necklaces by Brahmins and fakeers. The nuts of a euphorbiaceous plant, *Putrangiva Roxburghii* are used in the same manner; being strung up into rosaries and put by fond mothers round the necks of their children, on the supposition that they have the virtue of warding off evil spirits and keeping the little ones in health, whence the name, *putsa jiva*, "life of the child.

This is a curious bit of botanical folk-lore.–X.

* Translation of a communication to the Societé d'Acclimatation on a discussion reported in the *Bulletin Mensuel*, 3rd serie, tome ix., p. 178.

Topographical Distribution of the Nightingale.

There is an interesting article in the *Ibis* for 1865, by Mr. A. G. More, on the "Distribution of Birds in Great Britain during the Nesting Season." In this he gives Devon, Somerset, Wilts, Dorset, Hampshire, Isle of Wight, Sussex, Kent, Surrey, Essex, Herts, Middlesex, Oxford, Bucks, Suffolk, Norfolk, Cambridge, Bedford, Huntingdon, Northampton, Gloucester, Hereford, Worcester, Warwick, Stafford, Shropshire, Lincoln, Leicester, and Yorkshire. He observes that it "nests in East Devon, Somerset, Gloucester, Monmouth, Hereford (rarely), Shropshire (occasionally), Stafford, Derby, York, and in all the counties to the east of this line. The nightingale is also thought to have once bred near Sunderland, and has been heard at Carlisle. In the *Zoologist*, p. 241, Mr. R. D. Duncan repeats his statement that a pair of nightingales were heard, and the male shot, in Calder Wood, Mid-Lothian, in the summer of 1826—a warm season." Mr. More also notices the absence of the bird from Ireland, a grievance which the sister isle shares with a large part of England and Wales.

Manchester. X.

The article on the nightingale might be made more complete by reference to Professor Newton's remarks in the fourth edition of Yarrell, to Mr. A. G. More's article in the *Ibis* for 1865, to the late Edward Blyth's edition of White's Selborne, and to my chapter on the bird in "Our Summer Migrants," p. 32—43.

London. J. E. Harting.

Permit me to call attention to the following suggestive remarks by Edward Blyth in his edition of White's Selborne. London, 1836, p. 141 :—"The nightingale, I think, appears to migrate almost due north and south, deviating but a very little indeed either to the right or the left. There are none in Brittany, nor in the Channel Islands (Jersey, Guernsey. &c.), and the most westward of them probably cross the channel at Cape La Hogue, arriving on the coast of Dorsetshire, and then apparently proceeding northward, rather than dispersing towards the west, so that they are only known as accidental stragglers beyond at most the third degree of western longitude, a line which cuts off the counties of Devonshire and Cornwall, together with all Wales and Ireland, and by far the greater portion of Scotland, in which last mentiened kingdom the species has once or twice occurred to the eastward only of this meridian." There seems to be still much that needs explanation as to the singular capricious manner in which the bird is found to be distributed.—A.

Mr. E. C. Axon contributes a short paper on the "Topographical Distribution of the Nightingale." Among the counties where this bird is a regular visitor the author omits Bucks, where, in the Aylesbury district, its song is heard every spring. Nor is the fact brought out that the nightingale is more plentiful in the south-east of England than in the south-west. It is very sad that this charming songster is so much exposed to the snares of the bird merchant and to the guns of brutish idiots.—*Journal of Science*, July, 1882.

The Cat and the Parrot.

Théophile Gautier argued that the thoughts of dumb animals could easily be read in their faces by those who would take the trouble. As an example, he tells a story of "Madame Théophile," his favourite cat, and a parrot, which he was taking care of for a friend. The story, he protests, is not exaggerated by his imagination, but is simply an interpretation in words of the different expressions he saw in the face of the cat. The parrot was quietly seated on a perch, pecking her feathers, when "Madame Théophile" entered the room. Not having seen a parrot before, she was quite puzzled by the sight of this strange thing. Gautier says he could see plainly on her face the thoughts—"I wonder whatever that queer looking creature can be; I think it is a green chicken. A green chicken ought to taste very nice; at all events I will test the matter." With this intention she sprang to the perch, but what was her surprise to hear the parrot ask in a voice of intense gravity, "Have you dined?" Madame drew back, and the parrot continued, "What have you had to eat; a joint for a king?" Madame's thought now seemed to be, "It is not a chicken, it is a gentleman, for it talks!" and she slunk with a crestfallen appearance under the bed, where she stayed for the remainder of the day.—S. A.

ENGLISH UNIVERSITIES. *

BY JAMES BRYCE, M.P., D.C.L., FELLOW OF ORIEL COLLEGE, OXFORD.

ENGLAND now has five universities; formerly there were only two. Scotland has four instead of five: two at Aberdeen having been united into one. Oxford and Cambridge have existed for many centuries as fully appointed universities. The University of London is not a university in the ancient sense of the term, but rather an examining body for granting degrees, and it does that kind of work thoroughly. The university of Durham is new and not yet prominent. The new university at Manchester is the outgrowth of Owens College, and was originally endowed, like the Johns Hopkins, by a private founder, afterwards by subscriptions. It has become known chiefly by its work in natural science, but desires to encourage humanistic studies equally. We anticipate a great future for it. None of the English or Scotch universities are denominational; none have now (since 1871) religious tests, except that the established Church in both England and Scotland has possession of the theological faculties. English universities are self governed, except London and Manchester, which are controlled respectively by a senate (named by the Crown) and by a board of governors. The constitutions of Oxford and Cambridge are very complicated, and are understood by nobody outside the universities, and by few inside. Ancient usage, modern Acts of Parliament, and their own legislation have all gone to the making of them. These university governments have two modern assemblies, called in Oxford "Convocation" (made up of alumni having degrees) and "Congregation" (made up of graduates resident in the university town). These latter appoint the University Council, and all university statutes must pass through the three bodies.

In the matter of teaching, the Scotch universities are much like American colleges. The methods are catechetical; teaching is regarded as more important than degree examination; prizes are in vogue, and exercise great influence. In Scotland, prizes are usually awarded by vote of the students. Practically the system works better than would awards by the professors. Prizes generally go where they belong. The Scotch universities are cheap, because the fees are low, and the students live where they please. Their conspicuous and distinctive merit lies in the great stimulative power of their teaching. In England there is, with less of this stimulus, perhaps more of finished scholarship and greater opportunities for an enjoyable social life. There are three sets of teachers in the English universities: (1) The professors, who have hitherto taken a part in the teaching more dignified than practically important, except in natural science, where they have had nearly all the work to do; (2) the tutors and lecturers, who bear the burden of practical work, and give their instruction in connection with some college independent of the university proper; (3) private tutors, or "coaches," from whom forty years ago came nearly all the instruction at English Universities, but who are now much less active, because both university professors and college teachers have become far more industrious and efficient than they were then. In England examinations have become the main thing, and practically control the teaching, although the true view of them would rather be that they should exist as a test to teaching. The examinations, though very old, had become purely formal in the last century; their present importance is comparatively recent. In the Cambridge Triposes, students have heretofore (for a change is now being made) been arranged according to merit. At Oxford the arrangement has been into classes, according to merit, the successful

* Abstract of a Lecture at the Johns Hopkins University.

men being arranged alphabetically in each class, so that it is not known (unless the examiners give private information) where a man really stands in the class he has reached. Students are the more ambitious to reach as high a class as possible, because fellowships (especially at Cambridge), and success in such a profession as schoolmastering depend to a considerable extent upon such rank.

The fellowships yield from £150 to £240 a-year. Most of them are at Oxford awarded for proficiency in the same studies as are required at the examinations in the various schools of the university. There is hence difficulty in England in causing students to follow any course of lectures on branches of liberal culture, which do not come directly within the examinations in the schools, or help them to the obtaining of a fellowship. Among the practical university problems of the day are—(1) The reduction of expenses for students. The necessary cost at an English university is from £120 to £200 a year. Many students of course spend far more. (2) The creation of a more complete system of preparation for the leading professions. Something has been done towards the promotion of training for clergymen and for lawyers. Oxford and Cambridge have deficient facilities for medical training, because the towns are too small to support great hospitals. Natural science is now everywhere encouraged. (3) Ample provision is required for teaching in a great number of more recondite subjects, and encouragement ought to be given to men who do not intend to pass through the whole university course, to come and attend lectures in these subjects. (4) Something ought to be done to enable the university to help original research, and to increase the number of residents who devote themselves to the pursuit of learning. At present large funds are wasted in what are called "prize-fellowships." Unfortunately the land revenues of the colleges have suffered from the competition of Western America, and money is wanting to carry out some of the most desirable improvements. Commissions appointed by Parliament have been for the last few years carrying out a number of changes in both Oxford and Cambridge. It is still too soon to pass a judgment on their work; but as regards Oxford there is reason to fear that their so-called reforms will be at once too complex and too partial, not sufficiently broad, simple, and comprehensive. Broadly considered, the advantages of English university education may be said to consist in the combination of college and university life. The Scotch universities afford efficient class teaching; the German universities give the fullest professional instruction by lectures; the English universities excel in social advantages, and in opportunities for forming valuable friendships. The excessive development of their examination system has certainly injured their teaching, but that teaching has been improving in compass as well as in earnestness, and seems likely to improve still further.

The Blind and the Deaf.

Népomucène Lemercier, who was blind in his old age, had an ingenious theory of his own to account for the often-noticed cheerfulness of blind people as compared with the impatience of the deaf. "You see," he would say, "in speaking to a blind man you make him forget his infirmity; in addressing a deaf one you make him recall his."

Chiromancy.

A Fellow of the Royal Society, who asked, on page 12, a question on this point, will soon find out how little there is in chiromancy or palmistry if he will examine the palms of any old people he knows, and will compare their actual life histories with what *ought* to have been according to lines thereon. There is nothing in it. It is on the same shelf with astrology, divination by tea or coffee grounds, cards, &c. But surely the practice of and belief in this is now relegated to cunning gipsies and credulous servant girls!—W. Hellier.

NOTES FROM BOSNIA.

BY PROFESSOR G. BALINT.

DISAPPOINTMENT has followed my entomological excursions in this severe climate, and has constrained me to apply all my efforts to my Mongolian studies. In the months of February and March we had very fair weather here. This gave me a good hope for the coming season, of which Pope sung :

In that soft season, when descending showers
Call forth the greens, and wake the rising flowers.

Alas, the months of April and May brought some flowers, but more snow. And up to the present, June has been more like a chilly autumn than the genial summer season.

The capital of Bosnia, which consists mostly of mud-built houses, is fairly situated in a glen, on both sides of the small torrent Milatshka. The slopes of the surrounding mountains, mostly rocky, are rather poor in flora. The soil is clayey, stony, and wet, and nourishes, if cultivated, plum, pear, cherry and apple trees; but spontaneously only willows, osiers, hawthorns, common ferns, etc. On the few meadows you see but yellow flowers of the genus ranunculus, which by its venomous nature makes, as is known, the hay bad.

It is not difficult to enumerate the few representatives of the four classes of beetles (coleopterous insects), and those of the four classes of butterflies (lepidopterous insects) hitherto seen by me in excursions so often interrupted by the severity of the weather.

I Class.—Pentamerous beetles: Common and small species of Caraboids, Staphylinidae, Clavicornia, Lamellicornia (*e.g.*, the *Cetonia Aurata*—Rosebug, but not the Cock-chafer or May-bug), Serricornia, Elateridae (spring beetles).

II Class.—Heteromerous beetles: Stenelytra (*e.g.*, *Blaps mortisaga*).

III Class.—Tetramerous beetles: Curculios, Bostrichidae, Rhagium, and some of the Chrysomelidae.

IV Class. — Trimerous beetles: the well known Coccinellidae.

Of butterflies :—I Class.—Papilio, Pieris, Colias, Vanessa, Argynnis, Lycaena, Hesperia. II Class.—Macroglossa.

As the mother soil is, so are her children. But it is also true that the hungry crows and the bluish or greenish winged magpies, nesting under the roofs of the houses or minarets, are but too powerful rivals of the entomologists, for whom they leave only useless fragments of the larger and finer species of beetles.

Not having busied myself with ornithology, I did not know that the common and despised crows live almost like a married pair, and appear to care much more for their young than many people do about their children. They keep their nest and even the environs of it much cleaner than many people do their finely built houses. Doves, sparrows, and swallows are dirty birds in comparison to these simple crows. I had already seen at Küren, in Mongolia, a species of crows living under roofs, but they were dirty, noisy and quarrelsome lodgers.

Serajevo, 26th June.

The May Duke.

What was the kind of cherry known as the May Duke? It is mentioned in the following passage from "Sketches on Various Subjects," by Henry James Pye (London, 1797, p. 80):

"From reading old diaries of the weather and the time of the ripening of fruits, one should suppose our climate has experienced some wonderful alterations. In the "Kalendarium Hortense," at the end of Evelyn's "Sylva," cherries are mentioned as being ripe in May, and raspberries and currants in June; a circumstance I never remember to have seen, allowing for the eleven days' difference occasioned by the alteration of the style. We have a cherry, it is true, called the May Duke, but it is either called so from the time of its ripening in some other climate, or ours must be much changed."

There is no clue to the identity of this plant in Britten and Holland's excellent "Dictionary of Plant Names."

WILLIAM E. A. AXON.

OUR KNOWLEDGE OF FOSSIL SPIDERS.

BY SAMUEL H. SCUDDER,
Harvard College University.

UP to the present time a little more than two hundred and fifty species of tertiary arachnids have been described. Of these about one hundred and ninety are true spiders, while the remainder are mostly Acarina, Opiliones or Chernetidae. All but a single species are from European beds, and nine-tenths are preserved to us in the eocene amber. Were this latter means of restoring the ancient tertiary fauna unknown to us our information at the present day would be based upon twenty-four species, although in addition to these half a dozen more are indicated by simple reference to genera or families. This number is exceeded by those already found in the extensive deposits at Florissant, Colorado.

Whether we examine the American or European species preserved in stratified deposits (i. e. excluding amber), we find an almost total absence of any but true spiders or Araneides; in each (including a tick from the beds at Green River, Wyoming) a single species of Acarina is known, though a number of others, undescribed, are credited to European strata. In Prussian amber, on the other hand, though Araneides are vastly in the majority, the other groups of Arachnida form twenty-seven per cent. of the entire number of species.

This greater proportion of true Araneides in tertiary deposits,—a proportion intensified at the present day,—can scarcely be well compared with what we find in the older deposits, from the extreme paucity of remains in the latter. Brodie has found a single species (which he considers a true araneid) in the secondary rocks of England; and the European Jura has furnished merely half a dozen arachnids (nominal species, perhaps reducible to four, of which only a single one is referable to the Araneida,—Hasseltides, considered by Weyenbergh one of the Agalenidae. In the paleozoic formations, again, a dozen species are known, all but three of which have been considered scorpions,* Phrynidae and Chernetidae, or related to them; indeed, one of the other three has not been placed by its describer among the true spiders, but named Arthrolycosa only from its somewhat marked araneid features. The remaining two seem to be the only true precursors of this group known to us from the paleozoic rocks. The proportion therefore of the Araneides to other Arachnida is reversed between paleozoic and cenozoic times.

The Florissant spiders are distributed among the larger groups as follows; † Saltigradae (all Attides), 3; Citigradae, 0; Laterigradae (all true Thomisides), 3; Territelariae, 0; Tubitelariae (Agalenidae, 1; Drassides, 5; Dysderides, 2 =), 8; Retitelariae (all Theridides), 4; Orbitelariae (all Epeirides), 14 = 32. Nearly one half therefore are Epeirides, and after these the Drassides are best represented. A comparison with the European tertiary spiders shows that America is far richer in Orbitelariae, and Europe richer in Retitelariae, Laterigradae, and Tubitelariae, while the Saltigradae are almost equally represented in the two countries.

If, however, we except the species found in amber, and compare only those taken from the rocks in which they have been preserved, we shall reach, perhaps, a more just comparison, although the data will of course be far more meagre. The greater proportion of Orbitelariae in America is now found nearly the same as before, but it is not so great as the heightened proportion in Europe of Retitelariae, while

* Report has just come of a discovery of a considerable number of scorpions in the carboniferous rocks of Scotland, adding several species to those already known.

† The subsequent statements concerning the American species are based on unpublished material.

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the Tubitelariae become the group in which the proportion is similar in each; the Laterigradae is the only group where the proportion remains nearly the same as in the previous comparison, while the Saltigradae are nearly lost sight of in Europe, a single species being known.

Carrying the analysis a little further, we find that exactly the same families are represented in the stratified deposits of Europe and America in every instance excepting the Dysderides, a family which is unrepresented in Europe, and has a single member in America. It also appears that just those families which are represented abundantly in amber are also represented to some extent in the American tertiary fauna and (excepting, as before, the Dysderides) in the European rocks.

A comparison of the percentage of representation of the larger groups in the different horizons of tertiary times in Europe with that of Florissant seems to indicate a greater difference between the latter deposits and those of the upper miocene of Oeningen than between the same and either the lower miocene of Rott or the upper eocene of Aix and the Baltic amber; and although the proportionate numbers of Tubitelariae and Orbitelariae of Florissant, and especially the former, are more nearly like those of Rott, the representation of the groups in general allies Florissant on the whole with the upper eocene, rather than with the lower miocene of Europe.

Of extinct genera, there have certainly been proposed a very large number for the European spiders. Seventy-one genera are now known from tertiary deposits, sixty-six from Europe, and thirteen from America, eight being common to both. Of these genera, thirty-seven are accounted extinct, thirty-five from Europe and two from America, none of these having been found in both countries. As may be supposed, the European genera are largely composed of amber species, no less than fifty-two, including thirty-two extinct genera, being confined to amber deposits, which also contain other genera in common with the stratified beds.

To review rapidly the different forms of spiders found at Florissant, we may first call attention to a new genus, Parattus, to which the three species of Attides are referred; the fossil species of this family hitherto recorded are all confined to amber excepting one, Attoides eresiformis from Aix; one of the amber genera including nearly half the twelve species, Gorgopis, a genus allied to Phidippus, richly is represented to-day in North America; and it is interesting to find that Parattus, although a very aberrant form, with four large eyes instead of two, is more nearly related to Gorgopis than to any other genus. All but four of the twenty-one fossil Thomisinae thus far described come from amber, among them one Thomisus; Oeningen also furnishes two species of this genus, and Rott another, with a Xysticus; three species of Thomisus are found at Florissant. The three families of Tubitelariae which are represented in the European and American strata are the ones most abundant at the present day. The fossil Dysderides of Europe (sixteen species) are all from amber, and include eight species of Segestria, into which the single species from Florissant falls. The Drassides are very abundant in the European amber, and our own fauna shows four species of Clubiona and one of Anyphaena, both genera represented in amber, and Clubiona (which has eight amber species) also at Oeningen. Six genera of Agalenides are found in the European tertiaries, and Florissant adds another, Titanoeca (with two species), not found there, but allied to Amaurobius, which has three amber species. There is no family of spiders so abundantly represented in tertiary deposits as the Theridides, more than a fourth of the European species belonging here, with fourteen genera. America is for once poorer here than the stratified deposits of Europe, but possesses a single species of Linyphia, two of Theridium, and some egg cocoons referred for convenience

to the comprehensive genus Aranea; Linyphia possesses three species from amber and two from Rott; Theridium is one of the very richest of the amber genera, having sixteen species, while three other species are described from Oeningen and Aix. The proportion of representation is very different in the Epeirides, eight per cent. of the European fossil spiders belonging to this family, while the proportion in America is forty-four per cent., Florissant possessing even more species than the amber, including seven or more species of Epeira, one each of Tetragnatha and Nephila, neither of which have been found fossil, and four of a new genus, Tethneus, remarkable for its stout front legs; five species of Epeira are reported from the European tertiaries, two each from amber and from Rott, and one from Oeningen; not only, then, is Florissant peculiar for its richness in species of this family, but no other group shows so many novelties for the tertiary fauna.

If we inquire what testimony the fossil spiders of Florissant bear to the climate of that district in tertiary times, there is only one answer to be given. The present distribution of their allies certainly points to a considerably warmer climate than now,—a climate which may, perhaps, best be compared to the middle zone of our Southern States. The known living species of the genera to which they belong are in general credited to regions like Georgia in this country and the two shores of the Mediterranean in Europe. The presence of species of Theridium, Linyphia, Tethneus, and Epeira, including two-fifths of the species, has no special significance; but Thomisus, Segestria, Clubiona, Anyphaena, and Titanoeca, and especially Parattus, Tetragnatha, and Nephila, certainly present an *ensemble*, the indications of which cannot be overlooked.

The Dog of Montargis.

Has the well-known story of the dog of Montargis any foundation in fact?

A Lover of Dogs.

THE BUTTERFLY ORCHIS

(*Habenaria Bifolia.*)

BY R. STANDEN.

MOST botanists and country observers of flowers must have noticed that some species of plants are very erratic in their appearance, one year being plentiful and then disappearing for an uncertain period. Perhaps some particular feature of the season may account for this, but I leave the special peculiarity to be determined by some one better versed in the subject than myself. I have recently noticed a striking instance of this in the case of the Butterfly Orchis. This plant I have always looked upon as being one of the rarest in this locality, and for a number of years it has been a special quest of mine. I have hitherto but met with seven or eight blossoms in my life, but it has suddenly appeared in great profusion about a mile from Goosnargh. On the 18th of June, I was out for a walk with a friend, when he proposed we should go to a certain place, where he, several years ago, had gathered a single blossom, and which we had visited in succeeding seasons without meeting with any more. I agreed to this, and on reaching the spot we were surprised and delighted to find, not one, but hundreds of this fragrant orchid growing luxuriantly in this place; which, and its immediate vicinity, I have always looked upon as a sort of naturalists' paradise, from its teeming with numerous ornithological, entomological, botanical and other "good things." I have been in the habit of visiting it many times during the season to collect specimens, and can safely vouch that with the exception of the solitary instance above mentioned, the Butterfly Orchis has not flowered there for the last twelve years or more. It is a piece of land about an acre in extent, denominated by the farmer owning it as "good for nought," it being very poor and rough. It is surrounded by trees, in close proximity to a large stream; is in some places swampy,

and in others very dry. I was over it early in spring, and it was then thickly studded with the tall red spikes of *Orchis mascula*, locally called "crowfoot." These having had their day, the beautiful hyacinth-like spikes of the *Habenaria* now reared their heads in every direction. It was some time before we could bring ourselves to touch any of them, so pleased were we with our discovery, but when we fully realised their abundance we gathered a large bouquet, which delighted our friends, and still left plenty behind. In almost equal quantity, but not so noticeable, were the singular looking spikes of greenish flowers of the Birds' nest Orchis, whilst the Meadow Orchis showed its lilac-tinted blossoms in profusion. We also found the curious little *Ophioglossum vulgatum* (adder's tongue) growing abundantly here. I am making an experiment in growing the Butterfly Orchis in pots, and hope I may be as successful with it as I have been with the Birds' nest Orchis, and adder's tongue, both of which have grown well.

Goosnargh.

THREE STRATIGRAPHICAL QUERIES.

BY ALEXANDER RAMSAY, F.G.S.

1. WOULD some geologist cite evidence which will prove that the lower portion of the carboniferous limestone of Europe is the palæontological and stratigraphical equivalent of the lower portion of the carboniferous limestone of the United States?

2.—If they are not equivalent would some one indicate facts which seem to show that the carboniferous limestone of the United States is as a whole later than that of Europe, the upper portion of the latter being the palæontological representative of the lowest portion in the Western United States?

3.—Granting the possibility of distinguishing the lower, middle and upper Devonian throughout Western Europe generally, can it be safely asserted that the three divisions as now accepted are synchronous among themselves?

REFLECTED RAINBOWS.

BY W. STANLEY JEVONS, LL.D., F.R.S.

SOME years ago considerable discussion arose upon the question whether it is possible to see a reflected rainbow. Artists having been in the habit of inserting beautiful reflected bows in their landscapes, it was denied by some persons that such reflection could be seen, apparently on the ground that each person sees his own rainbow. It might easily be proved, indeed, from the laws of optics, that there is nothing to prevent the reflection of a rainbow, though it is true that the bow as seen reflected is not precisely that seen by direct vision. The sun's rays which have been refracted in the rain-drops may be reflected again and again from any suitable surfaces, and may still reach the eye of some observer.

But though a reflected rainbow is to be seen, there are comparatively few people, I imagine, who have seen one. I have all my life looked out for any curious phenomenon of the sort, and have on several occasions seen beautiful lunar rainbows, which are considered rare appearances. Only two years ago did I for the first time notice a reflected solar rainbow. The rarity of the occurrence is no doubt due to the fact that it needs the combination of three independent conditions to allow of the observation. In the first place there must be a bright bow, which is not seen many times in the year; secondly, he who sees the bow must happen to be in the neighbourhood of a piece of water suitable in extent and position to reflect the bow; thirdly, the water must be tranquil enough to allow of reflection. The last condition will usually be wanting, because rain-clouds will in most cases be accompanied by wind.

About two years ago, however, I saw a bright reflected rainbow, and what struck me much was that it assumed a form and character which I could not possibly have foreseen. I was on a steamboat, steaming up one of the

lower and broader reaches of the lovely Hardanger Fyord. The water happened to be almost perfectly tranquil, and yet at the same time a brilliant bow appeared upon a heavy shower of rain, which was falling at the further side of the fyord. The brilliant colours of the bow were finely contrasted against the darkness of the cloud and of the surrounding fyelds, and as the boat advanced through the glassy water it was easy, from the head of the vessel, to see a bright reflection. Instead, however, of the perfect segment of a circle, with all the seven colours clearly distinguished, I was surprised to see something entirely different, namely, a broad and nearly straight streak of confused whitish light, extending from the base of one side of the bow, to within ten or twenty yards of the steamer, where the light rather suddenly curved off in an awkward sickle-like form, and was soon abruptly lost. The fact is that the water, although so placid and glassy, was affected by a ripple almost imperceptible except by its disfiguring effect upon the bow. Now, as we see in the case of the sun or moon setting over a placid sea, the effect of such a ripple is to spread out the reflection into a long streak, each wave, within certain limits of distance, having some part of its surface disposed at a suitable angle to produce reflection. A complete rainbow springs perpendicularly at the sides, and approaches the horizontal at the summit. If we imagine the bow cut up into nearly square segments, it follows that many of these segments in the legs of the bow will be reflected into streaks, and these streaks will be superimposed upon each other. Thus the full light of the bow will there be seen reflected undiminished by the scattering effect of the ripple, and as different coloured rays, derived from different parts of the bow, will be mixed together, they will, in accordance with the Newtonian theory of light, be fused together into white light. As regards the summit of the bow, however, there would be no superposition of reflected streaks, and the one thickness of the bow would give insufficient light to be perceptible.

Without in the least denying that a person may casually, and still more probably by intention, witness a rainbow reflected in all its beauty of form and colour, I have no hesitation in saying that nine times out of ten the reflected bow will be no bow at all, but only a whitish streak. Artists will doubtless continue to paint reflected rainbows as they are seldom or never seen, rather than as they are seen.

It should be added that since I began to write this little article, I have happened to see a rainbow almost perfectly reflected, both as regards form and colour, upon the flat wet sands of the sea-shore. The watery surface, being unaffected by the moderate breeze which was blowing, acted as a nearly perfect mirror. Although persons walking upon flat wet sands see the clouds fully reflected therein, I cannot call to mind that I ever saw this effect represented in landscape paintings. I am of course far from denying that it may have been often so represented.

Plant and Bird Nomenclature.

It is of considerable importance to the student that all the objects which come within the range of his study should be distinctly named. Nothing tends more surely to confusion than the alterations which the names of many things undergo, more especially in ornithology and botany. Almost every district has its particular local appellation for both bird and plant: and while it perplexes the student, who with patient plodding determines to master these difficulties, it must in many cases act as a deterrent, especially where the desire to acquire a knowledge of the science is not very ardent. To illustrate what I mean I quote a few instances:—The plant *Nepeta Glechoma* is in our own district known as Robin-run-i'th'-edge, while in the list drawn up by the Rev. T. A. Preston, M.A., and quoted in the article on "The Observation of Periodical Phenomena," in the July number of *The Field Naturalist*, it is called ground ivy. *Senecio Jacobæa* is locally known as kettle-dock, while in the list just referred to it is

called Ragwort. These are not isolated instances, as every one acquainted with botany knows. Again, if we refer to the kindred science of ornithology, *Fringilla Cælebs* which is locally known as the pink, rejoices in no less than fourteen different names in as many different parts of the country. *Emberiza Citrinella*, which we know as the yellow-hammer, has had awarded to it at least nine other names. Many more instances might be cited if it were necessary. It may be said that the Latin names will be sufficient to indicate to the student any particular plant that may come under his notice. This, however, is not always to be relied on, as one example, which I will here give, will suffice to show. The common blue-bell in the Rev. Mr. Preston's list is denominated *Endymion nutans;* in another list, which I have before me, published by a local Natural History Society, it is called *Scilla nutans*; and in a little work on "Wild Flowers," issued by Ward and Lock, it is described as *Scilla nulens*. Admitting that the latter word, *nulens*, is a misprint, what must we think of the description which follows, in which it is called "the hare-bell squill, the gentle hare-bell of England, with its pendulous fine blue and sweetly scented flowers." This, I conclude, is quite a mistake, as the Latin name given to the hare-bell is *Campanula rotundifolia*. Surely there is ample reason here for requesting those who assume to teach the science of botany, to strive after stricter accuracy in the nomenclature of plants, and thus eliminate from its study a very serious difficulty. JOHN HOLT.

Harpurhey.

THE HABITS OF THE KINGFISHER.

BY P. PERCIVAL.

REV. E. M. Geldart's communication appearing in the July number of the *Field Naturalist*, and having reference to a supposed nest of the kingfisher found near Croydon, might give occasion for a discussion of some interest.

The accounts of the nesting habits of the kingfisher, given in the text books, differ to such a degree as to make it very desirable that more knowledge in this direction should be obtained. It seems to be not an uncommon idea that the kingfisher altogether shuns the society of man, and always builds its nest (as Mr. Geldart supposes) "on river banks and far from human habitations." That this is not strictly the character of the bird I can answer from my own experience. I have sometimes walked along the banks of the Irk, not further than three miles, if so far, from the junction of that river with the Irwell, in the city of Manchester, and I have seen the kingfisher fly swiftly by, even when the noise and bustle of a large factory has been sounding in my ears. Mr. Geldart raises the question, "Would the kingfisher build on flat ground, level almost with a pond"? Some years ago I knew of such a case, and the nest in question, instead of being "far from human habitations," was remarkably near to several, and also to a public road pretty well frequented. A young friend of mine, a keen bird-nester, told me he knew of a kingfisher's nest, and at my request piloted me to the pond, on the banks of which it lay. Unfortunately its nearness to the road had led to its spoliation, and nothing remained for me to see of what I was told was once a well formed nest, but a nicely rounded hole, and a few fish bones scattered around. It was perhaps not remarkable that such a nesting place should have been chosen, as there is not a river or rivulet in the neighbourhood of which I write, containing fish. With respect to the diet of the kingfisher, it is generally understood to consist altogether of fish, but the Daceloninæ, a group of birds closely allied to the true kingfishers, in addition to fish, feed upon small reptiles, crustacea, and insects; it is therefore not improbable that if fish were scarce, the kingfisher might vary its diet "*à la Francais*," and partake of a little frog. It is possible that Mr. Geldart's "frog-hunting bird" might after all be a kingfisher, but the evidence offered is too slight to form an opinion upon, either in favour of, or against such a theory.

Cheetham.

PROFESSOR HUXLEY ON THE HERLING.

PISCATOR Lancastriensis's question having been submitted to Professor Huxley, he has sent the following answer to the gentleman who propounded the difficulty to him.

July 12th, 1882.

Dear Sir,

I have no reason to doubt that the commonly accepted view that the "herling" is the grilse slate of the sea trout (*Salmo trutta*) is correct.

I am, yours faithfully,

T. H. HUXLEY.

A further communication on this subject will appear in our next number.

DIMINUTION OF OUR MIGRATORY BIRDS.

THE woeful falling off in numbers of our more tender resident birds, as thrushes, linnets, &c., which has been the subject of remark for the last few years in many parts of this country, is easily explained by the severity of the winters through which (with the exception of last winter) we have recently passed.

The diminution of our summer migrants, most of whom spend the winter in the genial regions south of the Mediterranean, cannot, however, be thus accounted for; and yet, I believe, it is equally the subject of remark to observers. The only explanation seems to be found in these tiny travellers being destroyed during either their northward or southward flight. That this is effected to a very grievous extent during their voyage to the sunny south is evident from a statement contained in the *Globe* of June 10, 1882. "In Italy, but especially in Northern Greece, and above all in the district 'Maina,' answering to ancient Messenia, they are caught by millions. They rest there in vast armies, tired and exhausted, for some days, in some places covering the ground. They are taken in heaps by large nets. packed in salt, and sent all over the Levant."

In the weekly edition of the *Times* of July 7th, 1882, there is a very interesting letter from "Ouida" on the destruction of small birds in Italy. It does not relate exclusively to the birds that cross that country in their spring and autumnal journeyings, but they must be included amongst the sufferers. The writer says, "So strongly has the feeling . . . . about the necessity to preserve birds grown upon all thoughtful people, that there is a general sentiment on the continent spreading daily, that some international movement and combination are necessary. Several ambassadors have spoken to me with great interest as to the desirability of some agreement between the nations for the protection of insectivorous birds, and also of the owls which keep down the rats that kill the young birds so largely. Petitions to Italy have been formally made by the various Protection Societies of France and Switzerland on this subject, and even in Italy a good deal is being done. There is a bill now before the Chambers, though there is, alas, no chance of its passing this Session, which will deal severely with the wholesale methods of bird destruction so terribly popular here. A distinguished Neapolitan Prince is the promoter of this bill, and many noblemen and gentlemen are in accord with him. The large liberties allowed to landed proprietors to deal as they please with trespassers gives a great power in this matter to the Italian gentry, if they will only use it. I know a distinguished person who has any trespasser that carries a gun fired at without warning. Generally, however, the birds of Italy are sadly unprotected, with the exception of the swallows and martins, which popular sympathy, usually speaking, does protect, though last year a brute at Bologna shot a thousand swallows to win a bet. . . . . If it could be made an affair of international arrangement, the birds of Europe would be safe, as they never can be while each country legislates for them according to its own choice. As it is, the migratory

birds run the guantlet of a myriad of perils, and it is a marvel that as many as do escape are left to us."

These statements throw much light on the lessening in the numbers of our summer visitors. Probably an international combination will be a partial check, but when we see the Wild Birds Act in country districts is quite inoperative, and look at the state of business in our House of Commons, we cannot expect help from that quarter; and the spread of intelligence in our day, beneficial as it is, will not do much towards checking the innate love of mischief so strongly implanted in our youth. Still we may hope even against hope when we know who takes note of every sparrow that falls to the ground.

NORTH LINCOLNSHIRE VICAR.

THE CLAVEL.

WHAT is the precise name of the flower described in the following quotation:—"All the females of South America are remarkably fond of flowers, especially the *clavèl*, or carnation, for which they give exorbitant prices. It is not uncommon for a single handsome flower of this kind to sell for ten or twelve dollars, and even for a doubloon if of a scarce colour, merely to be worn in the hair one evening. Scarcely any of the flowers found in these tropical countries have any scent, with the exception of such as have been originally introduced from Europe. To remedy this defect, many nosegays are perfumed with scented waters: even the rose of Peru often requires the assistance of art." (Campaigns and Cruises in Venezuela and New Grenada. London, 1831, vol. 1, p. 375.) The author adds: "The flower clavèl is frequently alluded to in the South-American songs as a *gage d'amour;* as, for instance, in that commencing 'El clavel fue la causa de yo querer te.'"

R.

MARTIAL'S EPIGRAMS ON THE AMBER FAUNA.

BY A MANCHESTER PYTHAGOREAN.

THERE are several interesting references to natural history in the epigrams of the witty Roman, whose humour was not always as innocent as might be desired. His epigrams on the small creatures so wonderfully preserved in amber are worth putting together, and it will be seen that although they are three in number they are little more than variants of one idea. The sisters of Phaëthon, according to the fable given by Ovid, were transformed into poplars, and the tears they shed at the untimely death of their rash brother were turned into amber. To this fancy there is an allusion in each of the epigrams.

DE VIPERA ELECTRO INCLUSA.

(Lib. iv. lix.)

Flentibus Heliadum ramis dum vipera repit,
Fluxit in obstantem succina gemma feram:
Quæ dum miratur pingui se rore teneri,
Concreto riguit vincta repente gelu.
Ne tibi regali placeas, Cleopatra, sepulcro;
Vipera si tumulo nobiliore jacet.

On weeping poplar boughs a viper crawls,
An amber drop upon the reptile falls,
Amazed she feels the gummy chains around,
And in their hardening mass is safely bound.
Her royal tomb Cleopatra need not prize,
For in a nobler one a viper lies.

DE APE ELECTRO INCLUSA.

(Lib. iv. xxxii.)

Et latet et lucet Phaëthontide condita gutta,
Ut videatur apis nectare clausa suo.
Dignum tantorum pretium tulit illa laborum,
Credibile est ipsam sic voluisse mori.

In shining tear, by Phaethon's sisters shed,
A bee is seen, as in its nectar, dead,
Its many toils have earned a guerdon high,
For such a tomb the bee might wish to die.

DE FORMICA SUCCINO INCLUSA.

(Lib. iv. xv.)

Dum Phaëthontea formica vagatur in umbra,
Implicuit tenuem succina gutta feram.
Sic modo quæ fuerat vita contemta manente,
Funeribus facta est nunc pretiosa suis.

An ant beneath a poplar found,
By amber tear was covered round;
So she that was in life despised,
In death preserved, is highly prized.

THE POET'S CALENDAR.

BY HENRY WADSWORTH LONGFELLOW.

THE last poems have been published of one who ever kept his soul open to the influences of external nature. Messrs. George Routledge & Son have issued "In the Harbor," which contains all of Longfellow's unprinted poems that will be given to the public, with the exception of two sonnets, reserved for the biography, and Michael Angelo, a dramatic poem, which will be issued later. From this last volume we extract the following poem :—

JANUARY.

I.

Janus am I ; oldest of potentates ;
Forward I look, and backward, and below
I count, as god of avenues and gates,
The years that through my portals come and go.

II.

I block the roads, and drift the fields with snow ;
I chase the wild fowl from the frozen fen ;
My frosts congeal the rivers in their flow,
My fires light up the hearths and hearts of men.

FEBRUARY.

I am lustration ; and the sea is mine !
I wash the sands and headlands with my tide ;
My brow is crowned with branches of the pine ;
Before my chariot wheels the fishes glide.
By me all things unclean are purified,
By me the souls of men washed white again ;
E'en the unlovely tombs of those who died
Without a dirge, I cleanse from every stain.

MARCH.

I Martius am ! once first, and now the third !
To lead the year was my appointed place ;
A mortal dispossessed me by a word,
And set there Janus with the double face.
Hence I make war on all the human race ;
I shake the cities with my hurricanes ;
I flood the rivers and their banks efface,
And drown the farms and hamlets with my rains.

APRIL.

I open wide the portals of the Spring
To welcome the procession of the flowers,
With their gay banners, and the birds that sing
Their song of songs from their aerial towers.
I soften with my sunshine and my showers
The heart of earth ; with thoughts of love I glide
Into the hearts of men ; and with the hours
Upon the Bull with wreathèd horns I ride.

MAY.

Hark ! The seafaring wild-fowl loud proclaim
My coming, and the swarming of the bees.
These are my heralds, and behold ! my name
Is written in blossom on the hawthorn-trees.
I tell the mariner when to sail the seas ;
I waft o'er all the land from far away
The breath and bloom of the Hesperides,
My birthplace. I am Maia. I am May.

JUNE.

Mine is the Month of Roses ; yes, and mine
The Month of Marriages ! All pleasant sights
And scents, the fragrance of the blooming vine,
The foliage of the valleys and the heights.
Mine are the longest days, the loveliest nights ;
The mower's scythe makes music to my ear ;
I am the mother of all dear delights ;
I am the fairest daughter of the year.

JULY.

My emblem is the Lion, and I breathe
The breath of Libyan deserts o'er the land ;
My sickle as a sabre I unsheathe,
And bent before me the pale harvests stand.
The lakes and rivers shrink at my command,
And there is thirst and fever in the air ;
The sky is changed to brass, the earth to sand ;
I am the Emperor whose name I bear.

AUGUST.

The Emperor Octavian, called the August,
I being his favourite, bestowed his name
Upon me, and I hold it still in trust,
In memory of him and of his fame.
I am the Virgin, and my vestal flame
Burns less intensely than the Lion's rage ;
Sheaves are my only garlands, and I claim
The golden Hârvests as my heritage.

SEPTEMBER.

I bear the Scales, where hang in equipoise
The night and day ; and when unto my lips
I put my trumpet, with its stress and noise
Fly the white clouds like tattered sails of ships ;
The tree-tops lash the air with sounding whips,
Southward the clamorous seafowl wing their flight ;
The hedges are all red with haws and hips,
The Hunter's Moon reigns empress of the night.

OCTOBER.

My ornaments are fruits ; my garments leaves,
Woven like cloth of gold, and crimson dyed ;
I do not boast the harvesting of sheaves,
O'er orchards and o'er vineyards I preside.
Though on the frigid Scorpion I ride,
The dreamy air is full, and overflows
With tender memories of the summertide,
And mingled voices of the doves and crows.

NOVEMBER.

The Centaur, Sagittarius, am I,
Born of Ixion's and the cloud's embrace ;
With sounding hoofs across the earth I fly,
A steed Thessalian, with a human face.
Sharp winds the arrows are with which I chase
The leaves, half dead already with affright ;
I shroud myself in gloom ; and to the race
Of mortals bring nor comfort nor delight.

DECEMBER.

Riding upon the Goat, with snow-white hair,
I come, the last of all. This crown of mine
Is of the holly ; in my hand I bear
The thyrsus, tipped with fragrant cones of pine,
I celebrate the birth of the Divine,
And the return of the Saturnian reign ;—
My songs are carols sung at every shrine,
Proclaiming "Peace on earth, good will to men."

CURIOUS SITUATION FOR A BEE'S NEST.

BY R. STANDEN.

A SHORT time ago, whilst passing under an elm tree, I saw what I at first pronounced to be a chaffinch's nest, but as I examined it more narrowly, I thought it had rather a singular appearance, so without more ado climbed up to it. It was at a considerable distance from the ground, and in a by no means easy tree to ascend; so, when I came within reach, I raised myself as far as possible and poked my finger into the nest, but a sharp pricking sensation in that member, an angry "buzz" from the nest, and a dashing attack upon me by several bees, sent me sliding down the tree much faster than I went up. I landed on the ground all in a sweat, and it was some time before I fully recovered my equanimity; for I have an instinctive and unconquerable antipathy to anything like a bee, I fancy from once getting terribly stung by inquisitively poking a long stick into one of my grandfather's beehives, when but a youngster in petticoats, a proceeding the bees strongly objected to, and punished accordingly, and since then a feeling of fear always comes over me whenever a bee or a wasp comes suddenly near me. I could not allow this feeling to prevent me from examining this unusually situated nest more closely, and I again ascended, taking care, this time, to keep on the opposite side of the tree. When I got above the nest I had a good look at it, and found that it had really belonged to a chaffinch, but had been taken possession of by the common Carder Bee (*Bombus muscorum*). The bees, seven or eight in number, had puffed up the inner lining, and I fancy had also carried up more moss, &c.; and the nest looked really neat and pretty. I gently opened it at the top with a long stick, and uncovered the few irregular-shaped dark brown honey-cells, which contained a very little honey. This is the first instance I have met with of a ground-loving bee thus choosing an arboreal residence, and I consider it a remarkable and noteworthy occurrence.

Goosnargh.

Preservation of Rare Plants.

Should I be seeking too great a favour in asking you to speak a word for *rare* plants? I have heard Field Naturalists' Societies decried, almost anathematised, because the members thereof, in their eagerness to obtain possession of uncommon plants, gather them, when found, without thought, apparently, whether such act will blot out any particular plant from the flora of the neighbourhood. I hope the objection is not universally valid; at the same time, the desire to possess objects of rarity is quite legitimate. But the thought has occurred to me (and it has also commended itself to the members of the Field Naturalist Society of which I am a member) that when a plant, *known to be rare*, is discovered in any neighbourhood, it be allowed to remain undisturbed until the ripened seed can be gathered and scattered abroad in similar situations, so that the good thing may be made more common. This will certainly call forth a little self-denial, but I think the members will be no worse for its exercise, and the multiplication of a beautiful plant will not in any way deprive it of interest. Field Naturalist Societies are such admirable means of enlightening our young people and fostering in them habits of observation and attention to minute details, that no pains should be spared that will commend them to the public. Yours sincerely, JAS. GEORGE.

Chorley, Lancashire.

CHANGES MADE BY CHILDREN IN THE PRONUNCIATION OF WORDS.

THE observations of Miss Talbot and the late Dr. Darwin point to a new field of inquiry, one in which investigation is at once easy and pleasant, and likely to be fruitful in result. Perhaps it may be worth while to reproduce some observations made by Mr. James M. Menzies on the changes made in the pronunciation of words by five children, three of whom he noticed from their beginning to articulate until their fifth or sixth year.

By the first child whom I shall call A :—

1. *Small, smell, smith, smite*, etc, were pronounced *hmall, hmell, hmite*, etc.; that is, the *s* when combined with *m* was replaced by the aspirate.

2. *Horse* and *used* were pronounced *lorse* and *lused* respectively.

3. *Hand* and *hands* were pronounced *rah* and *ror*.

4. *That, think, thing*, etc., were pronounced *hnat, hnink, hning*, etc.; that is, the *th* was replaced by *hn* (the aspirated *h*).

5. *Van, valentine, valley*, etc., were pronounced *ban, balentine, balley*, etc.; that is, the *v* was replaced by *b*; but

6. The *b* was replaced by *w* in the word *bulrushes*, which was pronounced *woolrushes*.

7. *Blue, glue, flew*, etc., were pronounced *boo, goo, foo*; while *green, screen, friend*, etc., were pronounced *geen, sleen, fend*, etc.; that is, the *b, g* (hard), and *f* combined with *l*, lost the sound of that liquid; and also *g* (hard), *str, f*, and some other consonants in combination with *r*, lost the sound of that liquid. This peculiarity was the last which was retained by this child.

By the second child, B.—

1. *Look, book, took*, etc., were pronounced *looch, booch, tooch*, etc.; the *ch* of which was a distinct guttural like that which is heard in Scotland or Germany.

2. *I want to eat that* was pronounced *I want to (h)eat that*; that is, the letter *h* was inserted between the *o* and *e* of the words *to* and *eat*.

3. *Begin* and *geography* were pronounced *fegin* and *feography*; while

4. *Breakfast* was pronounced *breffast*. This variation in these three words was invariably maintained to the end of this child's fifth year.

By the third child, C—

1. *Yes* and *toffy* were pronounced *hes* and *tossy*.

2. *Papa* and *Mama* were pronounced *a'pà* and *a'mà*.

3. *Aunty* was pronounced *attan*.

4. *Away, Holloway*, etc., were pronounced *a'ray, Hollo'ray*; that is, the *w* was replaced by *r*.

5. *Spoon, skin, Scotland, spread, strife, strong, string, squeeze, squall, sting*, etc., were pronounced *poon, kin, Kotland, pread, trife, trong, tring, queeze, quall, ting*, etc.; that is, the initial *s* was dropped.

6. *Smite, small, smell, sneeze, snake, snail, sway, swing, swagger*, etc., were pronounced *hmite, hmalt, hmell, hneeze, hnake. hnail, hway, hwing, hwagger*, etc.; that is, the initial *s* was replaced by the aspirate.

7. *Compost, impost, Ernest*, etc., were pronounced *compot, impot, Ernet*, etc.; that is, the *s* in the second syllable was dropped.

By the fourth child, D., the variations from the ordinary pronounciation were striking and distinct, and I had an opportunity of making a fairly exhaustive examination of the peculiarities of its speech. The result of my observation was as follows :—

1. *Whisper* was pronounced *lisper*, and

2. *Walk, wash*, etc. were pronounced *lawk, lawsh*; that is, the *w* and the aspirated *w* were replaced by *l*.

3. *Dolly, donkey*, etc., were pronounced *golly, gonkey*, etc.; that is, the *d* was replaced by *g* (hard).

4. *Brown, bring*, etc., were pronounted *bown, bing*, etc.

5. *Father, fan, fat*, etc., were pronounced *sather, san, sat*, etc; that is, the *f* was replaced by *s*.

6. *Speak, spell, spin*, etc., were pronounced *peak, pell, pin*, etc.; that is, the *s* which is combined with *p* is dropped.

7. *Burrow, furrow, sparrow*, etc., were pronounced *buddow, fuddow, spaddow*, etc.; that is, the *r* is replaced by *d*.

E.—This child was upwards of five years of age when he came under my observation, and there was only one peculiarity in his speech that I could detect.

Herbert was pronounced *Terbert*; that is, the aspirate in the first syllable was replaced by *t*.

Mr. Menzie's notes were made between 1863 and 1873, and are printed in the Transactions of the Philological Society for 1875-6. They appear to have escaped the notice of Miss Talbot and the subsequent writers on the subject.

S.C.

Preissia Commutata in Derbyshire.

At the July meeting of the Manchester Cryptogamic Society, Mr. W. H. Pearson read a few notes on *Conocephalus conicus* and *Preissia commutata*, and exhibited specimens. The latter species had recently been gathered by Mrs. Perrin in Chee Dale, and by Mr. Holt near Buxton. This rather widely distributed species is not recorded for Derbyshire in the London Catalogue.

Our Study Table.

ANTS, BEES, AND WASPS: A RECORD OF OBSERVATIONS ON THE HABITS OF THE SOCIAL HYMENOPTERA. By *Sir John Lubbock*. (Kegan, Paul, & Co.)—The fame of Sir John Lubbock's experiments has gone almost to the ends of the earth, and it is a matter for congratulation that he has put the results into this popular form. Whilst many previous naturalists have *observed* ants, bees, and wasps, Sir John Lubbock has, by careful and well devised *experiments* thrown fresh light upon many obscure points in their history. The subject will be dealt with by one of our contributors in an early number of this periodical, but in the meantime, we would cordially recommend all to read, mark, and inwardly digest the solid and yet appetising intellectual food which Sir John Lubbock has provided in this fascinating work.

A BIBLIOGRAPHY OF FOSSIL INSECTS. By *Samuel H. Scudder*. Republished from the Bulletin and Harvard University. (Cambridge, Mass. University Press, 1882.)—Mr. Scudder has compiled a guide to the literature of fossil entomology, and has done it with a fulness and accuracy that is deserving of the warmest praise. That some few papers have escaped notice is possible, and the author asks to be furnished with information about them. It is not likely that anything of real importance has escaped his notice, and most students will be greatly surprised by the extent of the list which gives references to the writings of about 400 separate authors.

A POPULAR HANDBOOK OF THE NATURAL HISTORY COLLECTION IN THE MUSEUM OF THE YORKSHIRE PHILOSOPHICAL SOCIETY, YORK. By *Walter Keeping, M.A.* (York: John Sampson.) Many scientific students will have pleasant memories of visits to the well known York Museum, one of the earliest and best of the provincial museums of England. It was founded in 1823, and has been increased by many valuable gifts. We are glad to learn that this progress in the present time not only keeps up with, but is in excess of that of former years. Thus, within the last few years, the geological collection has been increased by more than 100,000 specimens, the gift of Mr. William Reade, of York, and including not only his own fine collection, but one of fossils made by Mr. E. Wood, of Richmond, Yorkshire, and bought by Mr. Reade for presentation to the Museum. Mr. Keeping, in his preface, expresses a hope that this little guide will be of use both to the scientific visitor and to the general public who so largely frequent the museum, and there can be little doubt that his hope will be fulfilled, for the guide is clearly and carefully compiled, and the museum itself is generally acknowledged to be admirably arranged and classified.

ON AND OFF DUTY: BEING LEAVES FROM AN OFFICER'S NOTE-BOOK. By *Samuel Pasfield Oliver*. (W. H. Allen & Co. 1881).—In this bulky volume we have a selection from what the author himself describes as the rough scribblings and jottings in note and sketch book made when he was a young subaltern of artillery. But such a description would hardly do justice to his work, which in many cases has been carefully elaborated, and deals in a discursive but yet pleasant fashion with a wide variety of subjects. This is inevitable, from Captain Oliver's diversified experience, which has led him to divide his work into three parts, of Turania, Lemuria, and Columbia. In Turania we have sketches of Hong-Kong, and various parts of China and Japan. Lemuria is concerned with Madagascar, and the Mascarene Islands, whilst Columbia describes his South American experiences. The second part is further enriched by a paper on the natural history of Madagascar, contributed by Mr. J. G. Baker. Mr. Oliver writes with comparatively little care for literary polish. He has read a good deal, and has the results of his reading well under hand. He is not only a quick and accurate observer, but his observations suggest trains of thought and reminiscences of literature, which add very much to the pleasure of the reader. It is not a discredit, but rather a praise to such a book to say that its effect is scrappy. Mr. Oliver, in fact, seems to take the reader into his confidence, and show him the pages of his note-book in which he has jotted down the impressions of the day upon the varied and often curious scenes, amidst which his lot has been from time to time cast. The Japanese drama, luminous beetles, theories of volcanic action, and a host of other subjects, come in for treatment, and a quantity of interesting matter that the author has not been able to find room for in the text is crowded into the notes. The index, however, although a long one, is by no means so full as might be wished.

MANUALS OF HEALTH. (1.) "The Habitation in Relation to Health," by *Francis S. B. François de Chaumont, M.D., F.R.S.* (2.) "On Health and Occupation," by *Benjamin Richardson, M.D., F.R.S., M.A., L.L.D., F.S.A.* (3.) "Food," by *Albert J. Bernays, Ph. D., F.C.S.* (4.) "Water, Air, and Disinfectants," by *W. Noel Hartley, F.R.S.E., F.C.S.* (5.) "On Personal Care of Health," by *E. A. Parkes, M.D., F.R.S.* (Society for Promoting Christian Knowledge, London).—This is an excellent series, and can be cordially recommended. The names of the writers are sufficient to shew the judgment and discretion of the Society for Promoting Christian Knowledge in the selection of their authors. Where all are good, it may be invidious to single out any for special commendation, but the small book in which the late lamented Professor Parkes has compressed the most important information respecting the personal care of health, and Dr. Richardson's treatise "On Health and Occupation," may be especially commended, all the more so because they both relate to matters which are largely under individual control, which is not always the case with regard to air and food, as the exigencies of life may frequently force some to endure what they know to be insanitary conditions. All who are anxious to know how they may best either avoid or mitigate the evils which accompany our modern civilization, will find in these books some very useful hints and instructions.

THE KINGFISHER: ITS NEST, HABITS, AND RELATIVE SUPERSTITIONS.

BY R. STANDEN.

OFTEN has the writer, when rambling along the banks of some of the fine trout streams around Goosnargh, been gratified with a sight of the gorgeous-hued kingfisher, perched upon a branch overhanging the water, in some lovely secluded sylvan spot, keenly watching for the slightest movement of its finny prey in the pool beneath. Should it perceive the intruder, it instantly darts away down the stream, gleaming like a living meteor—strongly reminding one, as its brilliant hues flash and scintillate in the bright rays of sunlight glancing between the trees, of the bright plumaged denizens of the tropics, compared with whom the colours of the majority of our native birds are sombre indeed. But if it can be approached quietly and silently, as I have often done, it may be watched for a long time, and truly interesting it is to watch the manner in which it captures the small fish which form its principal diet. It is the most active on fine hot days, when there is plenty of sunshine, for, as it takes its prey entirely by sight, it requires the water to be very clear, and the surface calm and smooth. It usually sits with its body inclined downwards, attentively scanning the movements of the fish below, which no sooner comes within reach than it is pounced down upon with an arrowy rapidity which the eye can scarcely follow, and it very rarely happens that the bird misses its aim, but emerges from the water, giving itself a shake as it does so, carrying in its trenchant beak some luckless minnow or other small fry. Regaining its perch, it passes the fish rapidly through its mandibles, until the tail is reached, when it is swung aloft, its head banged against the branch several times, to kill it, and then it is either gulphed down, or carried away to the nestlings. The kingfisher is tolerably common hereabouts, and I have found as many as ten nests in a season. This year, I know of three nests from which the young have flown. But, no matter how many young may be safely fledged, next spring only the stationary pairs will be seen, for the parent birds appear to drive away the young from their own immediate vicinity, when they are able to look after themselves. I have calculated that at the commencement of the breeding season there will be one pair of birds to every mile and a half or so of the principal streams in this locality.

Except during the breeding season, the kingfisher is quite solitary, and I never see a pair together. Although Mr. Jennings says it is "rarely if ever found near the habitations of man"; in autumn, or early spring, I often notice one frequenting the ponds, or small brooks, near the village; and one, which I believe to be the same bird, came for six consecutive years to a wide ditch, abounding with sticklebacks, close to my residence. It became so familiar that it would only fly from one end of the ditch to the other, when I took friends to see it, which I often did; and sometimes it would be so obliging as to catch a fish in their presence, "just to show how 'twas done." I have several times seen a kingfisher hovering like a hawk over a quiet pond, and frequently dipping down and snapping up small beetles—the whirlgig beetle (*Gyrinus natator*), and the water-boatman (*Notonecta glauca*), principally, I think.

From its lovely plumage, and its peculiar habits, the kingfisher has long been an object of interest, and, from the many curious accounts given of it by the ancients, old Aldrovand describes it as being "the most celebrated and besung of all other birds." I have often been amused to read the comments made upon it by the old writers. Many of these comments are in themselves quite inaccurate, and yet are interesting, and show how want of careful observation may lead to erroneous and misleading conclusions. Aristotle cer-

tainly gives a very accurate description of the bird. "The halcyon," he says, "is not much larger than a sparrow; its plumage is painted with azure and green, slightly tinged with purple—these colours not being distinct, but blending into one another, and shining in an iridiscent manner over the whole body, the wings, and the neck; the bill is greenish yellow, long and slender." Pliny has partly followed Aristotle, but fuller details of the curious notions of the ancients respecting this bird are introduced into his account, which, according to the quaint translation given by Holland, is as follows—"The halcyons are of great name and much marked. The very seas, and they that sail thereupon, know well when they sit and breed. This very bird so notable is little bigger than a sparrow: for the more part of her pennage, blue, intermingled yet among with white and purple feathers, having a thin small neck and long withal. There is a second kind of them breeding about the seaside, differing both in quantity and also in voice; but it singeth not as the former do, which are lesser: for they haunt rivers and sing among the flags and reeds. It is a very great chance to see one of these halcyons, and never are they seen but about the setting of the star Virgiliæ (*i.e.* the brood-hen), or else near midsummer, or mid-winter; for otherwhiles they will fly about a ship, but soon they are gone and hidden. They lay and sit about mid-winter, when days are shortest; and the time whiles they are breeding are called the halcyon days; for during that season the sea is calm and navigable." According to the story in Ovid's "Metamorphoses," Ceyx, king of Magnesia, being shipwrecked, his queen, Alcyone (fabled to be the daughter of the wind) threw herself from a cliff overhanging the sea, that she might be drowned as well as her husband; but, instead of perishing, the gods changed them into kingfishers. I think, with regard to the vocal powers of the halcyon, it is probable that it was confounded with the sedge warbler, or dipper, which usually sings concealed; whilst the halcyon, perched upon some conspicuous branch overhanging the water, received credit for the performance; the cry of the kingfisher being a harsh note, rarely uttered.

The "halcyon's nest," described by Plutarch, appears to have been simply the crustaceous covering of one of the sea-urchins, probably the "sea-egg" (*Echinus esculentus*), which agrees in most particulars with his description. Aristotle has evidently fallen into the same mistake. Belon appears to have been the first author who correctly described the kingfisher as a mining bird, and more or less accurate accounts of its nidification have been given by various authors up to the present time. Gesner tells us that it "lines its hole with a soft bed of reed flowers;" Goldsmith that it furnishes it with the "down of the willow"; and Colonel Montagu tells us that at the end of the hole there is a bed formed of the bones of fish and some other substances, evidently the castings of the parent birds, usually about half an inch thick, and mixed in with the earth. He thinks that some time before the female begins to lay, both the male and female eject the refuse of their food in the nest, and that they dry it by the heat of their bodies, as they are frequently known to remain in the hole for hours, long before laying; and on this disgorged matter the female deposits and hatches her eggs. Belon's account is very similar. From the high authority of Montagu as an ornithologist, most modern authors have copied the latter description as authentic. The old hole of a water-rat has been mentioned as being often appropriated by the kingfisher, to save itself the trouble of digging; but no instances of this have come under my own observation, and I should consider such a situation a highly dangerous one, from the likelihood of the eggs or young being made a meal of by some prowling rat or other animal.

I have, in my time, found many nests of the kingfisher, and have had good opportunities

of carefully observing it. I have always found the burrow excavated to a depth of from two to four feet, at a short distance from the top of a steep "scar," on the brookside, or near to it. The hole slopes upwards in a straight line, unless a large stone causes it to deviate a little, so as to afford ample drainage to the nest, and carry off the watery excreta of the young, which are very fetid, and give to the nest and burrow a "most ancient fish-like smell." In searching for the nest, one's nose is a pretty sure guide, and the smell from it, once experienced, will not readily be forgotten. The entrance to the burrow is just about wide enough to admit the bird, but widens internally, and has a capacious cavity at the end. I have watched a kingfisher at work, and noticed the manner in which it threw out the earth or sand, loosened by digging with its beak, and it used its sturdy little feet very dexterously, sometimes ejecting the loose soil, to a considerable distance from the entrance. It begins to dig early in April, if it have not an old hole to resort to, and, in a new burrow, the eggs are laid on the bare earth, as soon as it is completed; and an accumulation of fish bones gradually forms under, and around them, for, like most birds of prey, the kingfisher disgorges, in pellets, the indigestible portions of its food. Glistening fragments of bones may also be noticed strewed along the whole length of the burrow, and sometimes lying outside, below the entrance.

If undisturbed, the bird will return year after year to the same hole, and I know of several such, which I am able to examine whenever I choose, by simply taking out a small sod, just over the nest, which is only a few inches from the surface. In such holes, the layer of bones in time attains a great thickness, and one I emptied out, for curiosity, contained as many as would have filled my hat. In an old burrow like this, the cavity in which the eggs are deposited is quite cup-shaped; and when the young are nearly fledged, the heat inside is very great. Should the eggs and burrow be destroyed, they generally set about digging another forthwith, not far away from the first, and lay a second clutch. I have never found more, or less than seven eggs in a clutch; although various numbers, from five to nine, have been given by Aristotle, Pennant, Temminck, Selby, and others. The eggs are of a beautifully lustrous semi-transparent, pinky white, but this pinky tint disappears in blowing, as it is caused by the yolk showing through the shell, which is extremely thin and fragile; and they are of a short oval form, each weighing about one drachm. The earliest date on which I have found the full clutch of eggs is April 27th, but generally it is the second week in May before the full complement are laid. The female sits for about eighteen days, and I think the male assists her in the work of incubation, for I have found them both in the nest, when I have examined it. When they have sat awhile they are loth to leave the nest, and I have frequently caught them in my hand, when feeling in it. The young are the picture of ugliness when first hatched, but soon improve in looks, for their feathers grow rapidly, and from the first exhibit the same showy colours as those of their parents. They remain in the nest until fully fledged, and frequently betray their retreat by their continual clamorous cries, and the parent birds keep them well supplied with food. After leaving the nest, the parents fish for them until they begin to provide for themselves, which they soon do, and I have many times come upon the whole brood, perched in a row, on a dead branch, or old rail, and they would all set up a great outcry when the old birds approached with food.

Besides the mythological fable of the floating cradle in which the kingfisher was said to rear its young; the ruling of the weather during its brooding; and the notion that the stormy waves are calmed for the sake of one pretty bird; other superstitions are connected with it, and a curious modern one still lingers hereabouts, to the effect, that its stuffed skin,

suspended from the ceiling, will denote every change of wind by the beak turning towards the quarter from whence the wind blows. I remember, when a boy, going sometimes to the cottage of an old gamekeeper, and admiring a kingfisher suspended from the roof in this way, and it was an object of great interest to me at the time, being my first introduction to this pretty bird. On one occasion I asked the old man if he would part with it, but he said he could not, "for it was lucky to have it, and it told which way the wind blew!" This superstition must be an old one, for Shakspeare, speaking of sycophants, says, they

"Turn their Halcyon beaks
With every gale and vary of their masters."

According to fabulous tradition, the dried body of the bird was reputed to possess the property of preserving cloth and woollen goods from the moth, which once induced drapers to hang it up in their shops, and the lifeless skin was pretended to have the power of averting thunder, augmenting hidden treasure, and bestowing grace and beauty on the person who carried it. Gmelin says, "the Tartars pluck the feathers from a kingfisher, cast them into the water, carefully preserving such as float, pretending that, if with one of these feathers they touch a woman, or even her clothes, she must fall in love with them. The Ostiacs take the skin, the bill, and the claws of the bird, shutting them up in a purse, and so long as they preserve this sort of amulet they believe they have no ill to fear." Forster, the navigator, records a similar superstition in the natives of Ulietea.

The Rev. E. M. Geldart has a query in the *Field Naturalist* for July, respecting "The nest of a frog-hunting bird"—which he supposes to be the kingfisher's nest. I have, on more than one occasion, met with a similar case, but have always ascribed it to the work of some animal, perhaps a rat. The "water hen" he mentions would, I think, hardly be likely to account for it. The perusal of his note has induced me to pen the foregoing remarks, which I trust will interest him, as well as other readers of this journal, who are not very familiar with the history and habits of the kingfisher.

Goosnargh.

Annamese Superstitions.

Consul Tremlett, in his trade report on Saigon and Cochin China for the past year, gives an interesting account of some of the superstitions which prevail in Annam. It is bad luck for a fish to leap on board a boat; the fish must be cut in two and thrown into the water again, half on either side. The capture of a porpoise is a very bad omen, for he is the messenger of infernal gods. The cries of a "Gecko," if odd, are lucky; if even, the reverse. A bird crying at night is always bad—a presage of death, in fact. This, says Consul Tremlett, is infelicitous; for some birds of the country only cry at night and all night. The squeak of a muskrat announces visits. A cock crowing at noon foretells that the daughters of the house will not turn out well. The tiger is, of course, much dreaded, and the mention of him is interdicted in some districts. Sacrifices of a pig are made at least yearly, with a document attached, which is, or should be, exchanged by the beast for the one sent him the previous year; if the tiger omits this, it is a bad look out for the village. However, it is all an affair of predestination, so it does not matter much. The water-buffalo is an imaginary animal living in rivers and only coming on shore at night; for all that, he is patent enough in the district, and uncomfortably curious towards Europeans. The Annamese have several kinds of talking birds—commonly a starling or a raven, who looks after the property while the master is absent, and recounts what has passed when he returns. To meet a serpent in the road is a very bad omen, and whatever is then in hand must be renounced. As for ghosts and spirits, they abound in Annam—always, everywhere, and of all descriptions.

Mathematical Symbols.

What is the origin of the symbols now commonly used in mathematical calculations? X.

THE GIANT DRAGON'S-BLOOD TREE AT OROTAVA.

BY JOHN PLANT, F.G.S.

IN August, 1881, as my friend, Mr. John Higgin, was on his return from the Philippines to visit old England once more, he made a detour from Lisbon to the Canary Islands to see the cochineal plantations as well as the physical wonders at Teneriffe. He made a pilgrimage to Orotava, in the hope of seeing for himself the renowned patriarchal Dragon-tree, which in one spot had survived 6,000 years of mundane changes all around, but found that every vestige of its existence had been swept away. Fifteen years before it had been broken down in a great gale. A great part of it had gone for dye-wood, the chips and fragments had been burnt, and visitors had carried off the remainder. He offered inducements to the natives, and the ground upon which the old tree had stood was dug into and several pieces of the bark were found, and the very last remains of the old giant of Orotava.

The Canary Islands were known to history in the year 1330, and the tree in 1402. In 1493 Alonzo del Lugo, who claimed the islands for Spain, relates that this hollow Dragon-tree was in use by the Guanche Indians as a temple for their heathen rites, but that he reformed such practices and made it into a chapel. Other Spanish historians and voyagers have left records of Orotava in succeeding centuries, and it was visited by Humboldt in June, 1799, when on his first journey for exploration in Central and South America.

"Although," he says, "we have been made acquainted from the narrative of many travellers with the Dragon-tree of the garden of M. Franqui, we were not the less struck with its enormous magnitude. We were told that the trunk of this tree, which is mentioned in very ancient documents, was as gigantic in the 15th century as it is at the present time. Its height appeared to be 50 or 60 feet, its circumference, near the root, 45 feet, but Sir G. Staunton, who was at Orotava in October, 1792, found that at ten feet from the ground the girth of the trunk was 36 feet, which corresponds perfectly with the statement of Borda in 1600." The trunk is divided into a great number of branches, which rise in the form of a candelabrum, and are terminated by tufts of leaves like Agucca. The tree still bears flowers and fruit every year. The Dracæna presents a curious phenomenon with respect to the migration of plants. It has never been found in a wild state in Africa; the East Indies is its real country. How has it been transplanted to Teneriffe? Does its existence prove that at some distant period the Guanches had connections with other nations originally from Asia?

Humboldt gives an engraving of the famous Dragon-tree in his "Atlas Pittoresque," but it appears that it was supplied from a drawing sent him by M. Marchais, and that from an earlier sketch by M. Ozone,.and the result, as Piazzi Smyth puts it, "was a gradual growth of error and conventionality, as man copies from man." There does not exist in any of the popular botanical works a truthful drawing of this extraordinary floral form of the natural order Liliaceæ.

The course of the history of this Dragon-tree since the time of Humboldt's visit, as far as I can trace it through the works of travellers, appears to consist of records of its successive mutilations from frequent destructive storms and the carrying away of pieces by visitors from every land. In 1819 a great gale wrenched off a large arm; in 1829 a deluge of rain fell upon the Peak, and sweeping down through Orotava, carried off nearly one half of the old hollow trunk, and Piazzi Smyth records "that certain Goths hacked an immense piece out of the thin wall of the hollow trunk for the Museum of Botany at Kew." In place of growing larger in later

years, the old tree was rapidly collapsing, when the Marquis of Sanzal came into possession of the Villa de Orotava, upon whose grounds the Dragon-tree stood. The Marquis at once put a stop to all depredation, and prohibited any pieces of the tree from being carried off by visitors. He further endeavoured to supply the abstracted portions of the trunk with masonry, trying thus to give a further chance of renewed life and vigour. For a few years the efforts had their reward, and the veteran became the lion for all modern visitors to mount the steep and gaze at with pleasure and wonder.

When C. Piazzi Smyth went on his astronomical enquiries in the Canaries in 1856, he had leisure and opportunity for a careful examination of the old Dragon-tree, the results of which are charmingly told in the chapter on Dracæna Draco in his "Teneriffe, an Astronomical Experiment," London, 1858, p. 800. Above all, he was able to take several photographs of the old tree, as well as of younger and more normal specimens of the Dracæna. He describes the perilous state of the tree from the unequal level of the ground, and says it was nearly smothered about the trunk with laurels, oranges, peach, and other trees, and that a rivulet—at times a torrent—flowed along its front. It had been known by the natives as a landmark betwixt properties adjoining for centuries. He measured it as 60 feet high and 47½ feet in circumference at that height, it was 28·8 feet in circumference at the part where branches spring out from the trunk, and at 6 feet from the ground was 35 feet 6 inches in circumference. But he says: "this is no proper tree with woody substance, it is merely a vegetable, an asparagus stalk of eminent slowness in growth, which has gained for it the credit of being the oldest tree in the world."

When the Dragon-tree is young, the simple stems are smooth, or marked only by shallow transverse indentations of foot stalks of past leaves. The compound stems are deeply corrugated longitudinally, and the trunk has an evident tendency to divide continually as it descends. When once a stem has branched its life seems to have departed, being replaced by the lives of the several young trees of its kind left growing on its summit, and whose roots, entering the bark and encasing the whole stem on every side, conceal its slow withering corpse from the light of day. Ages pass by, the young trees flourishing, die in their turn, each producing two or more new trees mounted on their summits, and thus presenting such a surface to the wind that the hollow base of the original tree would never be able, unless artificially assisted, to support the strain, and hence the true explanation of the hollow interior of the trunk from the remotest times in the past to the fatal autumnal day in 1867, when the great gale snapped asunder, for ever, the cords of life of one of the world's oldest inhabitants.

Darwin's Handwriting.

Professor Otto Zacharias contributes to Spemann's magazine, "Vom Fels und Meer," a sketch of the life of the late Charles Darwin. It is accompanied by a facsimile of a page of Darwin's handwriting. The entire letter is printed, and it is noteworthy that although so brief there are two places in which Professor Zacharias has not been able to make out what the words are. It runs as follows:—

Down, Beckenham, Kent,
Railway Station,
Orpington, S.E.R.

My Dear Sir,—I am sorry to say that I have not osteological knowledge enough for my opinion to be of any value with respect to the anomalous foot of the pig, which you have been so good as to send me. I do not know whether it has arrived at Down, for I am at present away from home; but when it arrives I will send it to Prof. Flower, at the Royal College of Surgeons, who has made a special study of the limbs of the Ungulate, and who is most careful and [two words here that cannot be deciphered.] I have asked him to send me a note, if the foot presents any remarkable peculiarity, and [another undecipherable word.] I receive any such note I will forward it to you.

I remain, dear Sir, yours faithfully,
April 26th, 1877. CHARLES DARWIN

This is interesting if only as showing the difficulties which obscure writing may occasion.

THE HOWLING MONKEYS OF BRAZIL,

MR. ERNEST MORRIS, writing to the *New York World*, gives an interesting account of some of his Brazilian experiences: After coffee in the morning, Manuel and I got ready for our expedition. We were soon dressed in marching order, not loaded with heavy rubber coat and high top boots, but in light Massachusetts drilling, with short shirt, open in front and worn outside the trousers; a gun, field glasses for spying out orchids, and a long wood knife completed my equipment. Manuel carried the provisions. Leaving the house we took our boat and paddled along the high rolling bank of the lake. No canoes were in sight, only a few flocks of noisy gulls which wheeled above our heads, and the white herons scattered along the muddy shore. Paddling for several hours, we left our canoe, and drawing our knives, cut our way into the forest, where we soon found an old path leading to the westward. After a half hour's tramp we reached the top of one of the hills, some distance from the lake. Here we had a far-reaching view of the lake and its large islands. While smoking our cigarettes Manuel told me no one knew the upper part of the lake. Canoes ascend it some twenty days' journey, to the rubber and Brazil-nut forests, which, if all reports be true, are among the richest in Brazil. Formerly all the land lying between the River Negro and the lake of Manacapuru was inhabited by the Moura Indians, but to-day I know of but four molocas or houses, of this tribe on the lake. Manacapuru has many outlets into the Amazon, and is also connected by numerous channels with a large lake known as Annaina, which lies far to the westward. During the high waters there are more than a hundred square miles of flooded forest, but during the dry season all the islands and sandy beaches are the camping ground of Indians engaged in pirarucu fishing.

Again we marched on, now using our knives and often wading some clear cold streams whose banks were covered with curious ferns or beautiful variegated caladiums. A damp earthy smell seems to prevail in these forests during the rainy season—possibly the odour or decaying vegetation; but often, as we slowly cut our way we would perceive a faint breeze laden with a strange perfume. While plodding along Manuel suddenly paused and whispered "Macaco!" (monkey). Creeping through the underbush for a very short distance I saw in a tall tree four large monkeys fast asleep. They were guaribas (mycetes), or howling monkeys, and were sitting all drawn up as it were, with their heads between their legs, some ninety feet above our heads, dreaming of their last midnight concert. Loading my gun with a heavy ball I took careful aim at the nearest monkey. Accompanying the report of the gun was the noise of cracking branches as the monkeys sprang into the adjoining trees, but one, the first I ever shot, came tumbling to the ground. The guariba monkeys are widely scattered through the whole valley. There are two kinds, the red inhabiting the north, and the black the south banks of the Amazon. These howlers go in gangs of from ten to twenty, and on dark, rainy days and at night make the forest ring with their howling. An old male generally begins the concert, the rest joining in at intervals. This monkey is rarely seen in captivity. I brought one from the river Napon, and for nearly two months was much interested in watching its habits. It slept nearly all day, but it was wide awake at night, when it would take its food. When making the low gutteral noise it would always close its eyes as if delighted with its own music. Orton says that they have under the jaw a bony goitre—an expansion of the *os hyoides*— by which they produce their loud rolling noise. I have often seen this bony cup-like goitre in the Indian houses, where it is believed that water drank from it will cure all cases of cold or whooping-cough.

I do not fancy monkey meat—that is guariba—it is too rank and coarse. Tired with our day's tramp we slept soundly until morning, and after a bath in the cold stream we again struck into the damp forests, Manuel carrying the rest of the monkey's bones, and picking them clean as he marched along. By nine o'clock we entered a forest, the trees of which were low, wide and spreading. Great bromellas and tillandsians which had fallen from the trees were growing in the ground, some with spikes two feet long bearing curicus red flowers. Now for the first time did I see orchids. Many epidendrums covered the trees, while growing on the decaying stumps were several plants of cycnoches, to me the most curious of all orchids. I passed these by, for I was looking for a plant that Manuel had shown me some days before. Deeper and deeper we entered the damp, silent forest, wet to the skin, and tormented by ants; for in cutting our way we frequently brought a nest down upon us. In the afternoon we arrived at the banks of a large creek, where Manuel pointed out the plants. By the aid of my glass I saw that they were *Cattleyas*, but of what species I could not determine. The leaves were broad and of a darker green than those of *C. El Dorado*. During the rest of the afternoon I gathered many plants. Towards evening Manuel wandered off into the forest after Bacaba, and on his return brought me a magnificent plant in bloom. Without a doubt I have several hundred plants of *Cattleya Wagneri*. The flowers are pure white, lip large, also white, aud the throat of a deep yellow. On our return to the lake one of the plants bloomed, and I was delighted to find it a variety of *C Wagneri*, for in the white lip was a streak of purple. I left nearly all my plants in the forest, for, by next month the stream will admit a large canoe, so then I can bring my orchids down to the lake and not have to carry them through the tangled forest. On the following day we began our return march and reached the Indian hut with hardly a rag on us, but satisfied with the result of our days spent in the forest.

THE BEGINNINGS OF MICROSCOPIC STUDY.

BY THOMAS BRITTAIN, F.R.M.S., PRESIDENT OF THE MICROSCOPICAL SOCIETY.

AS was natural, the startling discoveries which Leuwenhoeck made in his microscopic investigations produced a powerful and lasting influence. It was then that the true value of the microscope began to be appreciated, and the result was a large demand for the instrument. To meet this, numerous opticians set to work to discover the best form and arrangement of the materials of the microscope, so as to produce the most perfect instrument. Many of these were exceedingly curious and ingenious, and we have an excellent record of them by Henry Baker, F.R.S, who was born in 1698. He was an industrious worker in the field which Leuwenhoeck had done so much to make popular. He was the first to demonstrate the extraordinary vitality of the common Polyp *Hydra viridis*, proving that comparatively small fragments of the animal had the power of developing fresh ones in place of lost limbs, or portions cut away, and could become perfect Polyps under ordinary conditions. His experiments in other departments of microscopy were numerous, and secured for him a well-deserved reputation. His work, published by R. Dodsley, in 1743, is now before me, and is a most interesting record of the results of microscopic investigation up to that date. Baker died in 1774, and a considerable portion of a century had to pass before any material advance was made in microscopic investigation.

During this long period the study was probably not neglected, but we labour in vain to find any considerable progress either in the manufacture of the microscope or in important discoveries made by that instrument until we

get fairly into this present nineteenth century. It was then that the true value of the microscope began to be understood in connection with medical practice and human life. The study of animal tissues was no longer a matter of curiosity but a question of life and death, and that which had been looked upon by the medical profession as a pleasing amusement came to be acknowledged as an important factor in the daily duties of medical practice. At the time referred to, the third and fourth decade of the century, the writer knew medical men with large practice, who had never looked down the tube of a microscope, and who were utterly ignorant of the microscopic structure of animal tissues. Then Dr. Carpenter and several eminent men came to the front and gave an impetus to the study which is still felt. The result has been a marked improvement in the microscope itself, both in its mechanical arrangements and in the object glasses themselves. The opticians of France and Germany for a time appeared to take the lead in the production of superior lenses; but those of England have since demonstrated their ability to produce instruments which cannot be excelled.

Dr. Carpenter's books, and perhaps more especially his lectures upon the microscope and its revelations, helped very greatly to popularize the study. The writer gladly acknowledges his obligations to that eminent scholar for benefits received from him in this way. About 1830 the mechanism and general arrangements of the materials employed began to show a great advance upon the older instruments, but it was in the lenses that the chief improvements were manifest, and principally in the higher powers. The lower powers composed of a single lens remained much as before, while the improvements in the higher powers were carried on to a wonderful state of perfection. The provoking refraction which interfered with the definition of an object when seen with a high power is now got rid of, and what was obscure and doubtful before is no longer so, but becomes a matter of demonstration.

About 1840 the beautiful and complicated markings upon the silicious coverings of algæ known as diatomaceæ, became a matter of popular interest, and several species of this interesting genus became tests for the defining power of lenses. To see clearly the markings upon these test-diatoms it was necessary not only that the lens should be of a first class quality generally, but that the angle of aperture should be specially fitted for the object in view. Such lenses were eagerly looked after, and there arose considerable competition amongst opticians to produce the best possible lens for the purpose. Several of the members of the Hull Microscopical Society did good work in the study of this department of research by their discoveries, and stimulated the opticians to increased activity to meet increasing demands for still more perfect instruments from time to time.

A Stalk as a Sign of Sale.

In the last *Programme* of the Gymnasium at Dordrecht, Dr. S. J. Warren has published a very able comparison of Alkestis with the Indian heroine Sâvitrî; and some curious notes on the origin of *stipulare*, or the breaking of a stalk in confirmation of a promise, a contract, a sale, or a gift. It was well known that this custom existed both among the Romans and the Germans, and that traces of it survive to the present day in such expressions as "mit Halm und Munde," "mit Hand und Halm," "rompre le festu," &c. Dr. Warren has been the first to point out a survival of the same custom to India. Hariskandra, when he had lost everything, is represented as selling himself; and in offering himself for sale he places a stalk on his head (sirasi *trinam* dattvâ). This can hardly be taken in the sense of *trinîkar*, *vilipendere*, for he asks a lakh of gold pieces as his price. Dr. Warren thinks it is simply a sign that the king is a *bona fide* article of sale.—*Academy*.

THE TONGUE NOT ESSENTIAL TO SPEECH.

THE *British Medical Journal* reports a case, interesting to more than professional circles, which was recently under the care of Mr. Walter Whitehead at the Manchester Royal Infirmary. The subject was a cabinet maker of forty, who in consequence of a cancerous disease had his tongue excised by the method devised by Mr. Whitehead, and usually known by his name. The patient appears to have been within "measurable distance" of death from suffocation, starvation, and exhaustion, consequent upon severe and continuous pain. The removal of the tongue secured a certain amount of rest and diminished the pain. Tracheotomy was then performed, so as to lessen the disturbance caused by respiration and to avert the danger from suffocation. Means were also found of feeding the patient; indeed, the man has gained nearly a stone in weight. Further, we are told that "notwithstanding the loss of his tongue, the obstruction in the pharynx, and the opening in the trachea, the patient can articulate with remarkable distinctness, and can make all his wishes known without the use of signs or writing." This last circumstance will recall to some of our readers the controversy as to the reality of the occurrence usually known as the "miracle of the African Confessors." Ecclesiastical historians inform us that when by order of Huneric some of the orthodox inhabitants of Tipasa who refused to adopt Arianism had their tongues publicly cut out by the roots, to the astonishment of all they continued to enjoy the power of speech. As Cardinal Newman has pointed out, the evidence was unusually satisfactory. "Out of the seven writers adduced, six are contemporaries: three, if not four, are eye-witnesses of the miracle; one reports from an eye-witness; and one testifies to a permanent record at the burial place of the subjects of it. All seven were living or had been staying at one or other of the two places which are mentioned as their abode. One is a pope, a second a Catholic bishop, a third a bishop of a schismatical party, a fourth an emperor, a fifth a soldier, a politician, and a suspected infidel, a sixth a statesman and courtier, a seventh a rhetorician and philosopher." There can be little surprise that this consensus of evidence should have given pause even to Gibbon. With one exception, no physical explanation of the matter was adduced until the Hon. Edward Twisleton published his work to prove "The tongue not essential to speech." Accepting fully the substantial accuracy of the narratives that now remain of the event at Tipasa, he gave a number of examples of persons who have retained the power of articulation notwithstanding the loss of their tongue. One was the case of Pierre Durand, a French boy living at Saumur in 1630. Another was that of a patient of Tulpius, a physician whom many will remember as the professor in Rembrandt's famous picture of the "Lesson in Anatomy." A third was a Portuguese girl who was seen at Lisbon early in the 18th century by Dr. Joseph Wilcocks and M. Antoine de Jussieu. It was this case that led the Rev. Conyers Middleton to anticipate the explanation of the African miracle afterwards developed at greater length and with weightier evidence by Mr. Twisleton. In 1742 the Royal Society caused a careful examination to be made of the case of Margaret Cutting, of Wickham Market, who had completely lost her tongue by cancer, and yet continued to pronounce "letters and syllables very articulately." Sir John Malcolm mentions that the voice of Zal Khan, whose tongue had been cut close to the root by order of Aga Mahomed Khan, though indistinct and thick, was intelligible to persons accustomed to converse with him. The Emir Faris, although his tongue had been mutilated, continued to speak, and his ability in that

respect is testified by Mr. Richard Wood, who was then in the public service in the Lebanon. Sir John M'Neill met several persons in Persia who had undergone this barbarous punishment, but retained their power of speech, and Dr. Wolfe had one such person for his teacher in Mandaye. Several Persian cases are attested by Dr. J. R. Dickson. Another English case is that of Mr. Robert Rawlings, whose tongue was removed for cancer in 1861, and who could pronounce most letters, but was unable to sound either the initial or final *l* or *d*. Somewhat similar was the experience of a Manchester patient who in 1866 was under the care of Professor Syme. Six patients of Sir James Paget "could talk quickly and intelligibly after the healing of their wounds." To the long list adduced by Mr. Twisleton we may now add the case of the Manchester cabinet maker, who owes his escape from a painful and horrible death to the beneficient skill and knowledge of modern medical science.—*Manchester Guardian*, 26th July.

Honey as a Poison.

A curious circumstance is reported from the neighbourhood of Rodosto by a correspondent of the *Neologos*. A number of reapers, having sweetened their frugal repast by a plentiful admixture of honey, were speedily *hors de combat*, with all the symptons of dangerous poisoning. The inhabitants of the district naturally desired to elucidate the mystery, and, apparently considering an inadequate explanation to be better than none at all, aver that some serpents were found at the bottom of the barrel containing the honey, and were the source of its poisonous qualities. This bit of folk-lore does not satisfy the correspondent, and he recalls an incident on the famous retreat of the Ten Thousand. The Greek army after their defeat of the Colchians were surprised at the extraordinary number of the beehives, but those of the soldiery who allowed their appetites to be tempted soon had cause to regret their temerity. Those who had eaten but sparingly were to all appearance intoxicated. Those who had made more free were like madmen, whilst those worse effected lay upon the ground as those at the point of death. So powerful was the effect of the poison that the men lay upon the ground in great numbers as if there had been a great battle and a defeat. Fortunately the effect was transitory, and there were no fatalities. The men remained insensible for a period of 24 hours, and then recovered consciousness. On the third and fourth day they resumed their positions in the ranks, but with the appearance of men who had just escaped the hands of the physicians. Dr. W. F. Ainsworth in his travels in the track of the Ten Thousand had the curiosity to taste the honey of the country, and found that it had a bitter flavour. The peculiar effect is due to the poisonous quality of the flowers frequented by the bees. Hooker records that the spring honey collected by the wild bees in East Nepaul from rhododendron flowers is thus vitiated, whilst the *Azalea ponticum* and *Rhododendron ponticum* are said to have the same property. In America the mountain laurel or calico bush is said to render honey injurious. A species of *euphorbia* has the same reputation in South Africa. There is, in fact, ample evidence to show that the incident recorded by Xenophon is one example of the many ways in which history may repeat itself.—*Manchester Guardian*.

Sense of Locality in Animals.

A writer in the *Live Stock Journal* writes: "I brought a Collie dog (with Gordon Setter cross in it) on Tuesday, 21st March, by rail, from Llangollen to Shrewsbury. He had never before been in the latter place. I was away the two following days, so kept him shut up till I returned on Thursday evening, the 23rd March. At eight o'clock on this evening I turned him out for a few minutes, as he appeared to require it. About ten minutes after I called him to come in, but he was not seen nor heard of by me till Saturday morning, the 25th March, when I had a telegram from the home in Wales he had left, saying he reached there at eight that morning. He had therefore found his way back over a strange country, from Shrewsbury to Llangollen, in thirty-six hours after I had turned him out in the dark." This is an interesting confirmation of the remarkable facts mentioned by the Hon. Percy Wyndham.

C.

Sheffield.

ON GRIFFINS.

BY HENRY H. HOWORTH, F.S.A.

I.

A CURIOUS and interesting inquiry is to trace the origin of the so-called fabulous animals; animals made up of various combinations of the parts of others, or having no counterparts whatever in the real world, of which a goodly number passed muster among the zoologists of ancient and mediæval times. For the most part they are now remitted to the herald and the æsthetic decorator, and we hardly realize when we look at their fantastic forms that they were once part of the stock-in-trade of serious naturalists. Of these fabulous creations birds form a considerable part. Most of us have some acquaintance with the famous roc of the Arabian nights, the phœnix, the garuda, or king of the birds of Indian legends, etc., etc.; but it is with none of these that we propose to deal to-day. Our purpose is to say a few words about those four-footed birds which have such a wide reputation in literature and art, and of which a specimen in bronze now stands guard over the departed glories of Temple Bar, namely, the griffins. Probably none of the fabulous animals was so widely known in ancient times as the griffin. Its earliest occurrence known to me is in Egyptian art, in which it not only occurs, but has its own special name, akhekh. On one of the golden baskets represented in the tomb of Rameses the Third is a beautiful representation of a griffin. (See Wilkinson's Egyptians, ed. Birch II., 236, and III., 312.) This carries back the knowledge of the animal to the 13th century B.C.

In Greek art the griffin was very widely used, and also at a very early date. Herodotus tells us that about the year 640 B.C. the Samians ordered a bronze bowl to be made, which was decorated with projecting griffins' heads. (Op. cit. IV., 152.) The griffin occurs as a symbol on the coins of several cities, and of one of them, Abdera, we have a long series going back to the earliest days of the Greek coinage, and bearing the griffin as its continuous type. In addition to Abdera, the griffin appears as a type on the coins of Assos, of Phocaro, of Cherronnesus, and Panticaparum, in the Crimea, Chalcedon, etc. Among the Romans it is found figured on the coins of the family Papia, and on medals of Trajan, Gallienus, etc. Eckhel, in his classic work on ancient coins, has figured it as a follower of Nemesis, and as an assistant of Apollo, while Spanheim has figured a coutarinate, on which Antinous in the garb of Apollo is borne through the air on a griffin; and a coin of the Smyrneans, where it occurs with the wheel of Nemesis. It also occurs on numberless ancient gems. (Bulletin St. Petersburgh Academy, II., 79.) In the British Museum there is a terra cotta slab representing a struggle between two griffins and two amazons, and Taylor Combe tells us the struggle of the griffins and amazons, which is not referred to by any ancient author, is very frequently painted on vases. (Taylor Combe's Terra Cottas, page 3.) Another terra cotta in the same collection represents a combat between two Arimaspi dressed in Scythian dress and two griffins. (Ed. 6 and 7.) The griffins are especially associated with Apollo, who, on the coins of Chalcedon, is represented riding on a griffin, while on a gem described by Muller, Apollo is represented as a griffin fighting with the giants. (Muller's Ancient Art and its Remains, 449.) This connection with Apollo doubtless caused the widespread popularity of the griffin as a symbol. It is interesting in this view to remember that Diodorus tells us Apollo was worshipped by the Hyperboreans more than any other people, one town in their country being sacred to him. Leto, his mother, was said to have come from the Hyperboreans to Delos, and the oracle at Delos itself was said to have been founded by Hyperboreus and Olenus. Hesiod is the first of the Greek writers who mentioned the griffins and their guardianship of gold. His reference is preserved by a scholiast to the Prometheus of

Æschylus, v. 793. (Hesiodi Fragmenta, 123, Goettling.) We do not know whether this was an interpolated passage or not, at least if not it proves the griffins were known to the Greeks as early as the 7th century B.C. Æschylus himself refers to the four-footed birds on which "Ocean" mounts in the air. (See Prometheus, v. 395.) Herodotus is the first author who tells us any details about them, however. These he derived, as he says, from the report of Aristeas. Aristeas, the son of Caystrobius, was a native of Proconesus, a small island now called Marmora, and which gives its name to the well-known sea of Marmora. He is supposed to have flourished about the year 580 B.C. He was the author of a poem called The Arimaspeia, of which a supposed fragment is preserved by Longinus, which, however, has been pronounced to be false by Voss. Tzetze has also preserved another portion. In this poem he tells us that, inspired by Phœbus or Apollo, he travelled as far as the Issedones (i.e., in my view, the Usiun, a Turkish tribe of Central Asia), above whom were the Arimaspians, beyond them again were the *Gold-guarding Griffins*, and beyond these the Hyperboreans, who extended to the sea. He did not profess to have gone beyond the Issedones, and confessed that what he reported of the regions beyond was only hearsay. (Herodotus iv., 13 and 16.) In another passage Herodotus tells that the north of Europe was much richer than any other region in gold, and it was affirmed that the Arimaspi took this gold away by violence from the griffins. (Ed. III., 116.) By the north of Europe, as Rawlinson and others agree, Herodotus here means the well-known gold-bearing district east of the Ural Mountains, which modern geography assigns to Asia. The description of Herodotus implies that with him the whole of Siberia was included in Europe, which was separated from Asia by the Pharis, the Caspian, and the Arasces, i.e., the Jaxarte or Sihun.

Pausanias, in describing the famous statue of Athene, in the Parthenon, tells us the goddess had griffins on each side of her helmet, adding that the griffins were reported by Aristeas to have fought for gold with the Arimaspians. He adds, says Pausanias, that the griffins are like lions, but that they have the wings and beak of an eagle. (Op. cit. I., xxiv. Pliny quotes Aristeas and Herodotus as the authorities for his own account, in which he adds little to their notices. He tells us that the Arimaspi, who had but one eye in the middle of their forehead, had continual wars with the griffins, a species of winged animal, as is vulgarly reported. They extracted gold from subterranean caverns, and defended it from the Arimaspi. (Pliny, Nat. His., vii., 2.) Pomponius Mela, Clement of Alexandria, and Apuleius, all mention the griffin, but add nothing to our knowledge of it.

While Aristeas and Herodotus form the sources of one tradition about the griffin, another is traceable to that famous teller of marvellous tales, Ctesias. The works of Ctesias are only extant in extracts made by several authors. Among these is a long one preserved by Ælian about the griffin. Ælian tells us that the griffin was an Indian animal, a quadruped, in shape like a lion, and, like it, having strong claws. Its back was covered with black feathers, its breast with red ones, while its wings were white. Its head, he says, according to Ctesias, was blue, and its beak like that of an eagle. Its eyes were fire-like. It made its nest in the mountains. The Bactrians declared that they were the guardians of the gold, and that when they made holes in the ground to build their nests in, the Indians were accustomed to go and collect it. The Indians, on the contrary, denied that they were guardians of the gold, but that they lived where the gold was found, and that they attacked those who went to seek for gold merely in defence of their nestlings. The griffins, he tells us, could easily vanquish other animals, except the lion and the elephant. Those who went to dig the gold, therefore, worked at night for greater safety. The region

where the griffins lived was very desert. People went to dig it in bodies of a thousand or two thousand, taking with them mattocks and sacks. They worked when there was no moon, in the first place for greater safety, and, in the second, that they might more easily secrete their gold. Ælian says that those who went to fetch this gold were generally away from three to four years. (Ctesias Fragmenta, ed. Didot, 95 and 96.) Photius reports the account of Ctesias in a shorter form. He tells us that India also produces gold which, however, was not found there in the rivers, as in the Pactolus, but in lofty mountains. In these mountains dwelt the griffins, birds with four feet, of the size of wolves, with the legs and claws of lions. It was on account of these griffins that gold was so difficult to procure in these mountains (id. 82a). The India of these notices must be taken in a generic sense, as the land the natural background of the wonderful and marvellous, and not literally as India beyond the Indus. Solinus, an author of the third century, brings us back to the real home of the griffins, which he makes to inhabit Asiatic Scythia, where they dominated over the land, which was rich in gold and gems. He describes them as winged and very savage, making it very difficult to get at the gems, for the possession of which the Arimaspi struggles with them. (Polyhist xv., 22.) Heliodorus reports having seen among the Troglodytes a chariot drawn by two griffins, with golden reins. (Æthorp x., 26.) This again is a remission to Africa, the land of wonders, of a special wonder, which we have repeated in the fabulous letters of Prester John, which make him live in Abyssinia, and write a long catalogue of fabulous animals that lived in his country. Claudian connects the griffins with the Rephæan mountains, i.e., the Urals, with the worship of Phœbus or the sun; in another place he speaks of the Gryphes Hyperborei fondera fulva soli. (De IVo. Honor consil, 31 and 32. Epist, ad Serenam, 7 and 8.) The griffins were naturally used by the poets, and Virgil, long before Claudian refers to them in his Bucolics (viii., 27). The scholiast Servius, in writing on the passage, which is a bare mention of them, tells us how they lived in the mountains of the Hyperboreans, having heads and wings like eagles, but otherwise formed like lions; as being very hostile to horses, and as consecrated to Apollo (Servius ad loc). Hesychius tells us the hippalectryon, a combination of a horse and cock, and the griffin, were represented on Persian tapestries (Lexicon); and Hipparchus refers to the griffin as an especially Persian ornament (Poet. Com. Frag., ed. Didot, 653). As all who delight in early fabrics will remember, this representation long survived in the east, and nothing is more common in effect in early Saracenic silk tissues than the figures of the griffins. Stephen of Byzantium reports, on the authority of Hierocles, that the griffins guarded the gold among the Taskins, a Hyperborean people (see subvoc Taskuma). We will conclude our ancient notices with an extract which has escaped other inquirers, so far as we know, and which is peculiarly interesting in view of localizing the legend about the griffin. In describing the series of tribal migrations which ensued on the advent of the Avars, Priscus tells us the latter were driven from their own country by the peoples living near the ocean, who had left their country on account of the high clouds which had arisen from the fogs of the sea, and on account of the irruption of a great multitude of savage griffins which fed on human beings, and which were previously unknown (Excerpta in Prisc. Hist. ed. Bonn, 158).

Birds Migrating by Schooner.

The *Baltimore American* says that as many as 300 land birds came aboard the schooner "A. Denike," when off the New-Jersey coast, and there remained until opposite Charleston bar. They were kindly treated and fed with crumbs and grain, and remained contentedly, until suddenly they took flight for the rice-fields, their destination.

THE NIGHTINGALE'S SONG: IS IT SAD OR JOYFUL?

BY WILLIAM E. A. AXON, M.R.S.L.

M. LITTRÉ in describing his long and arduous labours in the compilation of his great dictionary says that at three in the morning — "D'ordinaire, ma tâche quotidienne était finie. Si elle ne l'était pas, je prolongeais la veille, et plus d'une fois, durant les longs jours, j'ai éteint ma lampe et continué á la lueur de l'aube qui se levait...Ces veilles nocturnes n'étaient pas sans quelque dédommagement. Un rossignol avait établi sa demeure en une petite allée de tilleuls qui coupe transversalement mon jardin, et il emplissait le silence de la nuit et de la campagne de sa voix limpide et éclatante. Oh! Virgile, comment as-to pu, toi l'homme des *Georgiques*, faire un chant de deuil, *miserabile carmen*, de ces sons si glorieux?"

Here M. Littré touches upon an ancient controversy as to the right adjective to be applied to the wondrous song of Philomela. Generally speaking it has passed into a commonplace to speak of the melancholy nightingale. There have, however, always been dissentients from this view. Prominent amongst these was the famous English statesman, Charles James Fox. In Lord Holland's preface to the posthumous History of James II., there is a letter on the subject in which Fox cites Chaucer, who characterises it as a *merry* bird, an epithet which was revived by Coleridge, who speaks of

> The merry nightingale
> That crowds, and hurries, and precipitates,
> With fast thick warble, his delicious notes,
> As he was fearful that an April night
> Would be too short for him to utter forth
> His love chant, and disburthen his full soul
> Of all its music.

Cuthbert Bede contributed to *Notes and Queries* (s. v., v. vii., 399) one hundred and nine different epithets applied by the poets to the nightingale, without including such as queen of all the quire (Chaucer), music's best seed-plot (Crashaw), and others; and Mr. W. Pinkerton added sixty-five. Among these designations are cheerful (Ayres), complaining (Shakespeare, Darwin, Hood), happy (Keats, Mackay), joyful (Moore), joyous (Keble), lamenting (Shakespeare, Drayton, Drummond), lovelorn (Milton, Scott, Collins), melancholy (Milton, Milman), merry (Red Book of Osfory, fourteenth century, Chaucer, Dunbar, Coleridge), mournful (Shakespeare, Theo. Lee, Pope, Thurlow), plaintive (Lyttleton, Thomson, Keats, Hood), pleasant (an old author), sad (Milton, G. Fletcher, Drummond, Graves, Darwin, Collins, Beattie, Byron, Hemans, Mrs. F. Kemble, Hood, Beddoes), solemn (Milton, Otway), sorrowing (Shakespeare), bewailing (Drummond), delightful (Shelley), elegiac (Dibdin), lovesick (Warton), moody (Hurdis), pitiful (Herrick), plaintful (Drummond), sely (Chaucer), sobbing (Planchè), sorrow-soothing (Shaw), sprightly (Elton), tearful (Potter), unhappy (Croxall), wretched (Shirley). Notwithstanding this variation, there seems to be a clear-majority of singers, who think the nightingale's "wild melody," "swelling," "tremulously slow," into "a storm of sound," is a "well-timed warble," "sadly sweet," of "harmonious woe."

Fox's letter gave rise to some observations from the pen of Dr. Martin Davy, Master of Caius College, Cambridge. Dr. Davy's tract is interesting, as being his only literary production, from its excessive rarity, only a few copies having been printed, and for the elegant scholarship which it displays. Fox says: "Chaucer, who, of all poets, seems to be fondest of the singing birds, calls it a merry note." Dr. Davy shows from many passages that in our older authors *merry* was used to express that which was agreeable without reference to mirth, and, in particular, cites the well-known old Saxon song "*Merrie* sangen the Muniches binnen Ely," which is rendered in an old Latin translation, "*Dulce* cantaverunt Monachi in Ely." In the English "Gesta Romanorum" there is a story of a nightingale,

and here the epithet merrily would seem from the context to be used in a sense indicative of joyousness.*

Dr. Davy misses the fact that Chaucer also terms it *sely—i.e.*, happy. He then proceeds to examine Fox's references to Theocritus Sophocles, and Homer, and to argue that in each case they indicate the plaintive characters of it song. Thus Fox refers to Theocritus as never mentioning the melancholy character of the song. Dr. Davy, however, thinks that the Sp. IV. 10, does intend to indicate the plaintive character of the strain. The passages in Homer Il. E. 882, and Od. A 719 are also cited on the same side. There is a passage in the Od. T 515, in which Penelope is compared to the nightingale only on the ground of her lamentations, although Fox speaking from memory interpreted the passage in a contrary sence. Sophocles in several passages marks the song as being sad (Cf. Tr. 964; Aj. 628; Elect. 107, 1075). Dr. Davy shows that the passage in Elect 145 had been somewhat misinterpreted by Fox. Aeschylus in Agamem 1167, uses a phrase which is thought to have been applied originally only to "the note of the nestling bird which being always both plaintive and feeble, was in a subsequent stage applied to sounds, in which either of those qualities might strongly predominatd; and, lastly, to cases in which one exclusively existed." Dr. Davy cites also Callimachus, Catullus, Virgil, and Ovid.

The "melancholy" nightingale is not however confined to western poetry, for Katebi speakes of the "plaintive warbling" of the nightingale."†

Perhaps the finest pen pictures of the nightingale are those of Tennyson, who unites contending claims, when he says—

> Fierce extremes employ
> Thy spirit in the dusking leaf,
> And in the midmost heart of grief
> Thy passion clasps a secret joy.

*Gesta Romanorum, Ed. Herrtage, p. 441.

†Ouseley: Persian Poets, p. 191.

What can be more delicately exquisite than this in the poem of the "Gardener's Daughter:"—

> * * * sighs
> Which perfect joy, perplext for utterance,
> Stole from her sister sorrow.

ON THE SENSE OF LOCALITY IN ANIMALS.

BY ALEXANDER RAMSAY, F.G.S.

IN the first number of the *Field Naturalist*, the Hon. Percy Wyndham put the following question:—By the exercise of what power do animals find their way back to distant places from which they have been removed? Assuming that the subject is worth enquiring into, I would suggest that by a systematic course of action more may be done in twelve months than has been done in twelve centuries towards arriving at a conclusive answer to the question. But in case it should be suggested that the results likely to be obtained will be small and unimportant, I would venture to make a few remarks before entering upon the suggestion in detail. It often seems as if the investigation of a truth or the working out of a scientific enquiry leads to nothing of any practical importance in such cases; things are not what they seem, for every comprehended truth, whether scientific or religious, is a decided acquisition to human welfare, both morally and practically. The more, then, we strive to add to the human stock of the knowledge of truth as manifested and in morals, the more we do to advance true science and true religion. Every advance of this kind is attended with a double blessing, but those who make such advances reap far more than those who are the passive recipients of the benefits accruing from them. Now taking five hundred members of our numerous *Field Naturalist* societies at random, I would ask if the comparatively small amount of work done by them does not arise from a certain apathy of interest in scientific matters, and from their

looking upon scientific pursuits as amusements and not as duties to be performed? The scientific hives, in short, contain a great preponderance of scientific drones. The working bees are few, and are usually much over tasked. It may be pleaded that individuals have their own businesses to attend to. The excuse is a good one to a certain extent, for each individual is doing his duty who is working at his business, and pursuing recreation to the extent required for the preservation and maintenance of bodily and moral health; but, as a rule, do they make use of the time left over and above what is required for the above mentioned purposes for trying to find out or propagate scientific truths? I am inclined to believe they do not, and I conceive that the reason of this is that they are not impressed with the true value of science, and with the responsibilities of all who are able to add to, and bring out more clearly our comprehensions of natural truths. It may be said, and I think it has been repeatedly said, that finite man should not attempt to grasp the infinite; and that therefore he is acting wrongly in making too keen a search into the works of nature. I cannot admit such an objection. Finite man cannot grasp the infinite; and all his searchings for truth will only reveal more and more the immensity of the ocean before him; so that the more he knows the more humble will he be in his own scientific attainments.

Then as regards the advantages attending an ardent enquiry into nature, I would submit that nearly all the evils and miseries experienced by the human race are the results of human ignorance; and on the other hand that the happiest of the race is in direct ratio with its knowledge of truth. Science is simply the formulated results of what man knows of nature, which is the manifestation of truth in the visible world around us; while true religion is the formulated results of what has been revealed to man, and represents what he knows of spiritual truth. True science and true religion, then, are man's only guides to his highest happiness, which consists in bringing his actions into conformity in all respects with the wishes of the ruler and sustainer of the universe and the author of all truth.

If this be so, then our supposed five hundred members ought to rise to a sense of their duty, and to do whatsoever is in their power to advance the science to which they have more particularly devoted themselves. If they have not taken any special pursuit in hand they may well begin by following out the suggestions which I would make for solving the question propounded at the commencement of this paper. All who have the leisure may do something, as it does not necessarily require a knowledge of books or of any learned scientific technicalities. The question should, however, be widened in scope so as to bring in all the evidence relating to the sense of locality in animals. The first observation should be made on man, as we are best able to appreciate the bearing of the facts in his case. These observations should be so conducted as to reveal how human individuals behave when taken a short distance from home, and notes should be made on every case both of failure and of success in reaching the destination. Then greater distances should be experimented with, and every detail recorded bearing upon the circumstances which are favourable or adverse to the successful return home. The individuals should belong to nations of all degrees of civilization and intelligence, placed under every conceivable set of conditions. In the same way observations of a similar kind should be taken on animals of all classes, and should include both those which possess homes or settled localities of habitation, and those which seem to have no preference for one place more than another. Let every investigator send in the results of his labours, be they little or much, to the editor of the *Field Naturalist*, giving name and address in order to allow of the individuals who volunteer to analyse and draw conclusions

from the material, may have full opportunities of eliciting such information as may be wanted, and of eliminating errors and misapprehensions. If such an enquiry were steadily pursued for twelve months from some definite date, say October 1, I cannot but anticipate some scientific gains.

Reflected Rainbows.

The perusal of the late Professor Jevons' interesting article on "Reflected Rainbows" in No. 3 of the *Field Naturalist* reminds me of another very rare natural phenomenon I once saw off the coast of Spain, in the Mediterranean. On October 13th, 1881, at five a.m., I went on deck. It was brilliantly starlight, with a slight purple haze stretching around the horizon, and the snowy caps of the Seirra Nevada clear above it to the N.E., from which a chilling breeze swept down upon the sea. Directly the sun rose, about 6-30, our ship was enveloped in a dense white mist, under which for a couple of hours we were obliged to stop the engines, as we were in the highway of ships, and in such mists fog-signals can be heard only at a short distance. As the sun mounted the skies the mist lifted from eastwards, leaving a steep and slowly receding bank to the N.W. against the land. On this was depicted a bright white bow of dimensions like to an ordinary rainbow, and slightly tinged with yellow at its feet, where, of course, the vesicles of watery vapour were a little more condensed than those above. The singular effect is no doubt due to the same cause as the pale rings we sometimes see round the sun, namely, the polarisation of light.

MORGAN BRIERLEY.

Nests in Strange Places.

Mr. J. Ellis writes as follows in the *Newcastle Chronicle*:—Passing through the gardens opposite Westminster Abbey the other day, I noticed that a pair of audacious, impudent sparrows had built their nest in the bend of the arm of the statue of George Canning, who appeared to be fondling and protecting the dauntless pair and their nest from harm within his breast.

THE LATE PROFESSOR W. STANLEY JEVONS.

THE untimely death of Prof. William Stanley Jevons has called forth a universal expression of regret at the early and tragic removal of a thinker whose intellectual activity found expression in such varied channels.

Prof. Jevons' last published article was that on "Reflected Rainbows," which appeared in the last number of the *Field Naturalist*. It was written during that seaside holiday which had so sad an ending, and is an interesting evidence of his keen interest in the operation of natural phenomena.

Mr. Jevons was born at Liverpool in 1835, and was drowned whilst bathing at Bexhill, on the Sussex coast, 13th Aug., 1882. After a brilliant career at University College, London, he spent five years in Australia as assayer in the Sydney Mint. On his return to England he resumed his academic career, and in 1862 graduated M.A. with distinction in the University of London. In 1863 he became a tutor at the Owens College, and in 1866 was appointed Professor of Logic and Political Economy. This post he held until 1876, when he resigned for the less arduous post of Professor of Political Economy in University College, London. This chair he afterwards resigned, in order to devote himself entirely to scientific and literary investigation. His book on the "Coal Question," which appeared in 1865, excited great attention from its warning as to the probable extinction of our coal fields. His other chief works are—"The Principles of Science;" "The Substitution of Similars the True Principle of Reasoning;" "Elementary Lessons in Logic: Deductive and Inductive;" "Primer of Logic;" "The Theory of Political Economy;" "Primer of Political Economy;" "Studies in Deductive Logic;" "The State in Relation to Labour;" "Money and the Mechanism of Exchange."

In addition to these works, Prof. Jevons was a frequent contributor to periodical literature. A complete list of his writings would bear emphatic witness to the catholicity of his learning and to the variety and extent of his powers of observation.

Prof. Jevons was elected a Fellow of the Royal Society in 1872, and in 1876 received the honorary degree of LL.D. from the University of Edinburgh.

The world of science has lost by the death of Dr. Jevons a vigorous and original thinker, who united to boldness of speculation the most scrupulous verification of facts and testing of hypotheses. His writings were eminently suggestive, and many of the ideas he has thrown out may yet be expected to bear abundant fruit. To the inner circle of friends his loss is one that cannot be counted or expressed in words. In every quarter of the world there are men who owe their best inspirations to him, and who will ever remember with affection and gratitude the modesty, sincerity, courage, and earnestness of his nature.

Celts in Buddhist Sculptures.

Mr. John Cockburn has called the attention of the Asiatic Society of Bengal to the representation of implements in Buddhist sculptures. He says that the celt makers never cast their axes with a transverse hole, through which the handle might pass, and he suggests that the reason for this might have been the extra quantity of metal required, which was costly and rare at that time.

Roman Longevity in North Africa.

At the last meeting of the Anthropological Institute Lord Talbot de Malahide read a paper on the longevity of the Romans in North Africa, and gave several instances of epitaphs and inscriptions on tombs of persons whose age had exceeded 100 years; in some cases the age of 120, 130, and even 140 years was asserted. It is of course impossible now to test the accuracy of these claims, but their accuracy may for the most part be with safety assured.

NOTES ON THE NATURAL HISTORY OF THE ISLE OF MAN.*

BY ROBERT GARNER, F.L.S. &c.

I THINK an interesting subject to work out is the peculiarity of the Island with regard to the distribution of animals and plants; *e.g.*, the *Megaceros* being common to Ireland and the Isle of Man, whilst the mole and several other little animals do not extend to the two Islands. Geological changes account, I think, for some of the peculiarities, but other considerations, such as paucity of wood, weakness of flight, &c., for others.

I have always thought the North of the Island may turn up novelties, animal or vegetable, high or low. In fact the Island promises a good harvest to a real worker even in botany, and I think the North of the Island as promising as any part.

I see that two voles do not exist in Ireland. Are you sure they do in the Isle of Man? The larger species of water-rat, Mr. Crellin says, *is* found. Can you really ascertain whether it is or not, *for certain?* The Curraghs, or larger rivers, would be the most likely for it. I expect you have not the real water rat for the following reason. Its bones are always found, often in considerable quantities, in the English barrows, often a mile or more removed from water, where it seems to have frequented to hibernate, and perhaps to sharpen its chisel-like teeth by gnawing the bones, &c. I never heard of any of this little animal's bones being found in your barrows; but of course I have no personal knowledge of Manx barrow opening. The subject is well worth attention. The true water rat is directly known by its curious teeth.

What do you say about your cats? Is the want of a tail a mere monstrosity? May not the principle of economy of material, acknow-

* From a letter addressed to Mr. P. M. C. Kermode, read at a Meeting of the Isle of Man Natural History and Antiquarian Society, at Maughold, 29th June, 1882.

ledged to exist in islands, be a fair subject for consideration in the matter ? Also I should say, from watching a cat in a tree opposite my window, that in a 'tailed animal the appendage is of use in arboreal life especially—ergo, in your feline variety the appendage has ceased from its less use. I should suppose the Manx cat to be rather a rock variety than an arboreal one, var: *rupestris* rather than *arboreus*.

The skull of a Manx cat would be of high interest, with or without the contained brain—why of such interest is just this. It is considered that the cerebellum directs the movements of the body—its side lobes the limbs—the middle lobe or vermiform process the trunk—and, possibly, the tail,—if so, the Manx animal having no tail, ought to have the vermiform process less developed than a tailed animal. * Whether this be so might, perhaps, be told by comparing the inner surface of the two, but of course better from the preserved brain

I have often found very interesting bones and skulls on the sea shore. I took a bone once to one of the most learned naturalists at Aberdeen—the Prof. of Anatomy of St. Andrew's, and he gave the said bone up. I had no museum or good plates at the time to refer to, so put it in Huxley's hands, and called on him a few weeks afterwards. He said it had been a puzzle to him—though not "a bone of contention." The long and short of it was that it was the fore part of the breast bone of a very rare seal! of a halbert shape.

I hope you will continue to look for the newts.

I consider the Island a very rich place for ichthyological pursuits; also for the marine invertebrata. Both Ramsey and Douglas I have found capital places for the dredge and for mollusca ; and Port Erin a more interesting spot still, and, I think, unsearched by Forbes. We took splendid radiata there, brought up on the hooks of the lines, and also in the lobster traps.

I took with my own hand at Port Erin the blue-striped wrasse ; and also the red or three-spotted ditto. I once saw at Douglas the blue shark ; and also bought an angler, and think I brought the many-spined stickleback home from the Island. I think we have yet the stickleback and three-spotted wrasse, together with a specimen of your small trout, in spirits at our Museum. I think the trout are worth your attention.

I think *Pholas crispata* is found as a dead valve in most parts of the Irish Sea. I dredged *Solenensis candidus* at Douglas, but only the dead valve. Port Erin seems likely for *Lutraria elliptica*. I think *Cardium tuberculatum* has often been mistaken for *C. aculeatum*, as by young Prof. Forbes and the old Englander, myself! I've asked G—— to look for the *Turritella*. I think I found *Natica monilifera* dredging near Douglas. There is a shell like an oyster or scallop, generally much smaller, and with the under valve having a hole by which the shell is attached by an operculum or shelly stopper to oysters, &c. This is the *Anomia*, but there are two rare species to be carefully distinguished. One of them I should expect to find in your deep waters. It is the *Orbicula* or *Crania*. Forbes says he found a valve at Ballaugh, but I think he has not recorded it in his larger work on British Mollusca, but only in his Monensis. You must keep a look out for this. It would be sticking to stones, or perhaps to shells.

You should preserve specimens of your squat lobsters or Galathea and *all* the *Crustacea*. We (*i.e.* myself and the hon. sec.) dredged at Ramsey the *Pecten tigerinus*. Forbes did not drop on it.

The purple sunstar (dredged in Ramsey bay,

* Since the above was written this is found to be the fact:—In an Article on "Prof. E. Forbes and his Country," Midland Naturalist, March and April, 1878, the author wrote: "The tailless cat is probably aboriginal, both here and in Cornwall. Many of the Manx fowls are destitute of the tail feathers. There may be some physical reasons for these peculiarities, but what they are must be left to others to explain.

Sept., 1880, by yourself.) was a good find. I never found it. I did not find the birds foot star in Manxland at all, but did find a cushion star at the Calf, which came up on the chain-cable of the steamer, looking just like a pincushion of crimson velvet. We found two splendid star-fishes on the fishing lines at Port Erin—one the spiny cross fish and the other the lingthorn—both miserably figured in Forbes.

With respect to ascidians, some are a good size, as long as the finger, with gelatinous or leathery coats. Any one is worth preserving in *weak* spirits.

I think I know what the bird is which Camden calls "maup," and says it is not found in your Island. I believe it to be the lesser or blue-tit, which, in Staffordshire, is called by boys "Tom maup" or "Tom naup."

I think a very interesting thing that you could do would be to make a list of the Manx names of fish, birds, and plants. I mean the better known sorts.

I am glad you have a worker amongst the mosses and hepaticæ, which, though I used to consider one of my peculiar "vanities," I have let go for 40 or 50 years. Had you not better combine mosses and jungermanniæ with lichens? They are very pretty, dry beautifully, and may be abundant in the Island. Mr. Harrison mentioned a plant found which it struck me might be the tooth-wort, *Lathræa Squamaria*; it is of a tawny colour, flowers in April, and is parasitical on the roots of the hazel.

Mr. Harrison's fossil is curious and puzzling. It seems like a coal plant, stigmariæ, but the rock looks more igneous than usual.

A close search should be made in the old red sandstone, a short distance on the north shore of Peel Bay, for any trace of fossils; a small fragment might settle points in dispute as to the nature of the stone. The brick works at St. John's also should be narrowly searched, and any fragmentary shells, and fossils, or corals secured. It is a problem what lies under the north of the Island.

I do not recollect meeting with a strongly marked beach, but think in the coves below Onchan there is the appearance of a beach higher than the present one by two or three feet. Does not the shore in the north of the Island alternately form and dwindle, differently at times and in places, owing to both marine and atmospheric causes, the land sometimes advancing, sometimes the sea? But the whole subject seems interesting and requiring study as to the north of the Island.

The worst of your archæologists is that they are chary of using the pick and spade, an hour's work with which is more than half a volume of antiquarian learning.

† The Stickleback was the Maritime or fifteen-spined. The Wrasse we caught at Port Erin were the Bollan or Ballan, the Blue-striped, and the Three-spotted. I am surprised to hear the two last are only sexual differences of one species.

A Tomtit's Nest in a Letter-box at Nantwich.

About six weeks ago a pair of tomtits built a nest in a letter-box belonging to Mr. Lockett, on the highway near Shrewbridge Hall. Several eggs were broken, owing to newspapers falling upon them, but the birds in no wise daunted, stuck to the nest, and succeeded in hatching six young ones. The letter-box is kept locked, and whenever the letters are taken out the old birds resent the intrusion upon their privacy by pecking the person opening the box. Any letters which happen to fall on the nest are removed on one side by the parent-birds. The aperture by which they obtained ingress and egress is merely a slit 1¼in. wide by 4in. long.—*Warrington Examiner*, 24th June, 1882.

Mineralogy.

Can any of your readers kindly inform me if there is a magazine devoted to the interests of mineralogy, and if so, where, when, and at what price it is published? I have not been able to hear of one as yet, but surely there must be a journal in one way or other connected with so important a science as mineralogy. W.P.L.

NOTES ON SOME RARE BRITISH MOSSES.*

DIDYMODON CYLINDRICUS, Bruch.

BY JAMES CASH.

THE date of the discovery of this moss as a British species is not exactly known. It is, however, clear that Dr. Taylor—who was joint author with the late Sir W. Jackson Hooker, of the Muscologia Britannica—was the first to observe it, about the year 1825, and he maintained its specific distinctness against the opinions of some of the best muscologists of the time. Its history is both curious and interesting. Few species have furnished such abundant material for controversy, and there is none probably (though the fact is little known to present-day muscologists) over which the differences of opinion have been so warm, or lasted so long.

The moss which figured and described in the Muscologia Britannica (Ed. II., 1827) under the name of *Weissia tenuirostris*, both description and figure being by Dr. Taylor, whose co-author did not share his views regarding it. Its identity with the *Weissia cylindrica*, of Bruch (Bridel's Bryol. Univ.) published some time previously, was not suspected, and the confusion was rendered all the more complete through Taylor's bad figure in the Muscologia, where the teeth of the peristome are represented as closing the mouth of the capsule at right angles. The learned authors of the Bryologia Europœa, arranging the species with the genus *Didymodon*, quote *Weissia tenuirostris*, Tayl., as a synonym, and observe, "The figure of this species in the Muscologia Britannica is very inexact, and appears to have been taken from a plant totally different, as Wilson remarks in a note in Hooker's Journal of Botany. The specimens of *Weissia tenuirostris* of the English authors, for which we are indebted to this *savant*, nevertheless accord with our plant in all but minor details." Mr. Wilson, in the Bryologia Britannica, adopts Bruch and Schimper's arrangement, and likewise condemns Dr. Taylor's figure.

In 1831 *Weissia tenuirostris* formed the subject of a correspondence between Hooker and Wilson. The former—speaking of it as "our famous *Weissia tenuirostris*," "most earnestly" desired to know Mr. Wilson's views regarding it. An excellent muscologist himself, he rarely failed to submit a critical point to Mr. Wilson's keen judgment, and not unfrequently accepted his decision as final. "*Weissia fallax* and *W. tenuirostris*," he wrote (Feb. 17, 1831) "bother me;" and in a subsequent letter (April 21st, 1831) he expressed his confident belief that the peristome of *W. tenuirostris* in the Muscologia was drawn (inadvertently we must assume) from *W. curvirostra*, Brid. (*Didymodon rubellus*, Roth.) "Why," he argues, "if according to your ideas, some species of moss may have teeth or no teeth, may not others have erect or horizontal teeth? Were it not for some sport of nature of this kind, how can we account for the differences of opinion respecting the structure of well-known mosses which do exist?" Whether Mr. Wilson was, at this period, in correspondence with Dr. Taylor, is uncertain, but some years later the doctor, finding the accuracy of his observations impugned, made a vigorous defence of *Weissia tenuirostris* in letters which are still extant. Mr. Wilson had expressed himself as not satisfied about the species in question, whereupon Dr. Taylor wrote (31st Dec., 1838), "You say you are not quite 'satisfied about' my *Weissia tenuirostris*. Strike, but hear me! Whatever other reasons there may be for putting this plant out of the list of good species (and I am not aware of them), the plea in your letter is to me peculiarly unsatisfactory. I do not know what kind of pecimens Hooker and Greville collected; but I have some of the original before me, *and it is not true that they are mixed with any*

*Read before the Manchester Cryptogamic Society.

variety of W. curvirostra." He adds, "I cannot help Hooker and Greville making what admissions they please; but it is not true that the peristome and capsule (magnified figures) in the Muscologia Britannica were taken from the fruit of *W. curvirostra*. Besides, this last has a very different peristome: it is necessarily erect, from the structure of the capsule, for the thick columella, rising above the mouth of the capsule and filling up the base of the operculum, the peristome necessarily is erect against its sides. In the specimens before me the capsules are on pedicels, rising from the stems that bear leaves so very like those of *Tortula tortuosa*." Then follows an account of the discovery of the moss. "There is," says Dr. Taylor, "a little history connected with this species. Hooker, Greville, and I, on a winter's morning, set out for Campsie. The lads were light and long-legged; we had no sooner reached the botanising ground than they strode up the mountain with admirable activity and force. In my despair of keeping up with them I remained at the bottom, pottering my eyes over a surface scarcely twenty yards square. On their return they found me on the spot where they had left me, and it would have delighted you to witness the hearty manner in which they laughed at me. Next day, on emptying our boxes, the plant we are speaking of alone attracted my attention as something rare. This was mortifying in one quarter. Hooker and Greville, with sharpened wits, did their utmost to demolish the pretentions of our plant to being considered distinct. The examination and wrangle were conducted through one long day; on the second they yielded; and now, it appears, they are ready to make a present of it to anyone of good authority." With this letter Dr. Taylor sent to Mr. Wilson a *Didymodon* from Nepaul, which, in his opinion, very nearly approached, if it was not identical with, the Scotch plant, "and which, at any rate," he observed, "shows that other mosses may have leaves strongly resembling those of *Tortula tortuosa*."

The moss having established its claim to rank as a species, the point in controversy between Taylor and Wilson was as to its generic characters. Their observation of the peristome led them to different conclusions. "With respect to the unfortunate and inapt character given of horizontal teeth," says Dr. Taylor, in a letter dated 14th March, 1839, "I do not think much stress should be laid on such a mistake, for what could it mean? Not that the teeth lay at right angles to the side of the capsule, for in what moss was such a structure ever observed?—no; but in reference to the more upright peristome of *Weissia curvirostra*, with which it was desirable to contrast it." The writer argues that the Campsie moss could not possibly be a mere form of *Tortula tortuosa*, as Wilson had supposed. The discovery of the same moss near Dolgelley by Mr. Wilson led to comparisons with specimens from this and other localities, and the final determination of the species as a *Didymodon*, though Dr. Taylor would never fully admit it. He struggled hard to retain it among the *Weissiæ*, and wrote to Wilson (12th Nov., 1840), confident of having overcome all opposition, as follows: "I was glad to see your specimen from Dolgelley, with the peristome dissected and nicely put up in talc.* You are quite right that peristome has 32 teeth in pairs; hence it is no *Weissia*; hence it is not *W. tenuirostris*. From this proposition I think it is very easy to determine your Dolgelley moss. Two days after receipt of yours I went to Gortagaree and found five or six capsules of *W. tenuirostris*. One of these,

* The old method of preserving dissections of mosses, detached leaves, &c., for microscopical examination was by putting them between films of talc. The process has been superseded by mounting upon glass slides, now brought to a great state of perfection by Captain Cunliffe. Some old talc preparations, in the writer's possession, are, however, neatly done, and no doubt served a useful purpose.

the first that came to hand, I have dissected, and send the peristome in talc, together with the plant from which it was cut."

Evidently the doctor thought he had, at length, solved the muscological puzzle. We do not happen to possess a copy of Mr. Wilson's reply, but its effect upon Dr. Taylor's mind may be inferred from that gentleman's next communication, dated 30th Nov., 1840. "If my last letter, in the case of the Dolgelley moss, evinced too great a facility of decision, which, I think, was occasioned by the evidence before me, yours of the 18th inst., containing a variety of dissections, has thrown me into such difficulties and such perplexity that I am sure I am not in a fit state for forming any decision; instead of which I shall merely offer some considerations on the subject:—

(1) When I meet tufts in a barren state I confess I am always puzzled; sometimes supposing they belong to *Tortula tortuosa*, sometimes to *Gymnostomum tortile*, Fl. Hib., sometimes to *Didymodon brachydontius*, and sometimes to *Weissia tenuirostris*.

(2) Mr. Wilson at one time thought *Weissia tenuirostris* and *Tortula tortuosa* the same, and I confess I should never have pronounced them decidedly distinct if I had not taken it as a principle that in nature such variations as from thirty-two teeth (of the peristome) approached in pairs to sixteen simple and equi-distant never occurred.

(3) Mr. Wilson, in his letter before me, pronounces that barren specimens sent to him by Mr. Gourlie are of *Gymnostomum tortile*, Fl. Hib. * * They were taken out of a tuft which produced the capsule whose peristome I dissected and sent in my last with the stem off, and which Mr. Wilson says is "the very same" as his moss from Dolgelley, which we both agree is *Weissia tenuirostris*.

(4) The kind of variation from thirty-two teeth approached in pairs to sixteen teeth would appear to occur in *Tortula tortuosa*. Our common state gives the former. Mr. Wilson's first dissected specimen from Matlock gives the second. The same kind of variations occurs in *Didymodon brachydontius*, as evidenced in the specimens I collected near this place in April last, and sent to you. Finally the same kind of variation is now seen in Mr. Wilson's Dolgelly *Weissia tenuirostris*.

(5) In size of stem, length of leaves, and degree of involution of the margin I have seen *Tortula tortuosa*, *Gymnostomum tortile*, Fl. Hib., *Didymodon brachydontius*, and *Weissia tenuirostris* each vary very distinctly.

(6) On the other hand I ought not to omit to state that the time of flowering [fruiting?] of *Tortula tortuosa* with us is in July and August, of *Weissia tenuirostris* in November, of *Gymnostomum tortile*, Fl. Hib., and of *Didymodon brachydontius* from April to June.

It is (Dr. Taylor concludes) a bewildering theme, which I had better relinquish for the present."

Though the general conclusion was that the species was properly placed in the genus *Didymodon*, a conclusion which subsequent observation has abundantly confirmed, Dr. Taylor was still hardly convinced, as the following extract from a letter of his to Mr. Wilson, dated 28th Oct., 1841 (the last in their correspondence, as far as we know, which contained any reference to the subject), will show:—"I found lately a small bit, in fruit, of *Weissia tenuirostris*, and in all the capsules that I examined the teeth were entire, and even destitute of any dark longitudinal medial line. Such was the case with the first Campsie specimens that I found. Now, I allow that your specimens from Wales sometimes showed a division of the teeth resembling that of a *Didymodon*, and sometimes, in other specimens, the teeth were quite irregular in size, shape, and division, from all which I conclude that, as in *Didymodon brachydontius*, Wils., so here the normal, however infrequent, figure of the teeth is of a *Weissia*."

These reminiscences are interesting, because they show the extent of our indebtedness to the muscologists of a past generation, through whose careful investigations British muscology has benefited to a degree now little dreamt of. It only remains to be added that *Didymodon cylindricus*, Bruch (*Weissia tenuirostris*, Taylor), has been found very plentifully for some years past, near Dolgelley, by Capt. Cunliffe and others, in several places with fruit. Whether it is still to be found at Campsie—on that classic spot "not twenty yards square," at the foot of the hills, where Dr. Taylor first picked it up—we cannot tell, but it is very probable that a search there would lead to its re-discovery.

THE VOICE OF OUR ANCESTORS.

BY R. ANGUS SMITH, PH.D., L.L.D., F.R.S.

THE short paper which I wrote for the Scottish Society of Antiquaries under the title of "Archæology of the Voice" may be held to have a slender basis, but an old friend, a German, had said to me that the voice of a Scot was strange; it was like that of no other nation. It was when an Engineer in Germany was explaining to me the condition of the fuel question and his apparatus for cutting and preparing peat, that I heard the tones of a Scotchman in his voice, and I recollected the saying of my friend and wondered, because, although I had seen early a good deal of Germany, and often visited it since my youth, I never heard the same tones in that country. I stopped, perhaps too hastily, the conversation on peat, and remarked on the singular fact that a German should have such a voice. "But I am not a German," was the reply, "I am a Dane." The place of birth, perhaps, unhappily, may be called Germany now, it was a part of Schleswig from which it is believed that much of the population which came to our island embarked, not far north of the Elbe. Were these Angles or Saxons, or were the Angles not comprehended under the term Saxons in this country? Accurately or otherwise our people could not always distinguish them, and seem from Wales to North Scotland to have called them all Saxons. And yet there was a sufficiently powerful Angle band to give its name to England, shewing a reason for believing that at a time at least they were strong enough to include the Saxons.

There is fighting to be done yet over these names, but I take up a question touching on a very gentle point. I think I have found in this tone of voice near the Elbe, in a quiet village, a proof that the same has sounded along the shores of Denmark, and on the seas on our east, and established itself in Scotland. Although the language has altered so much that we could not understand a seventh-century man speaking, we should require only to go to a little distance so far as to lose the exact word, and still we should recognise the tone, and claim him as a countryman. I remember being within hearing of two voices in this way, but too far off to hear words, and I recognised the notes of Scotch and English. The notes from Schleswig have lasted through barbarism into civilization, through dialects, constitutions, religions and centuries, and they are perhaps in their delicacy most clearly heard in Scotland (south-east), being mixed with rougher sounds in many places. But is it strange that a note should be the same when vibrations are subject to laws of the most stringent kind? Yes, it is strange. There is an infinite variety in the sounds of the human voice, and I know of no instrument that can imitate any of them well, except perhaps the organ when it sounds like a choir of fine musicians, or the voice of a multitude. I cannot even include the phonograph, although it delivers sounds that are clearly intelligible, because it caricatures. We shall never be able to teach the sound of words permanently until we make an instrument to pronounce; one that can be made from description, so that future men, by knowing the dimensions, the material and the force used, may be able to have a fac-simile. Spelling cannot teach future generations, and the attempt is useful only for a short time, and the efforts of the society for the purpose will be vain. In the course of centuries, however, the human voice has carried its most delicate tones from generation to generation, and we recognise them, lengthened as their run has been, more than in that of any telephone wire, as delicately preserved, but more subject to destruction as one would suppose, than the white skin, the yellow hair, and the blue eyes, of the people of whom I speak.

The subject is new and needs study. When some are attending to the great buildings of the past, the weighty pyramids of Egypt, and

the cities of Mesopotamia, and others look to the cairns and circles of our own country made in times unknown, and some again attend to speech and to manners, let us not forget those strange and gentle vibrations that accompany the human voice that are found as characteristic of nations, and with variations in families as family peculiarities, and with subvarieties in individuals, distinguishing them from all others. I am not a musician, and although I have a keen perception of some sounds, I must even confess myself quite unable to explain in any way the notes alluded to; and I am sufficiently far from the language of music not to know if I can give a more appropriate word than intonation to that which I would describe. It is sometimes most improperly called accent. Who knows if this attention to notes and tones may not produce as many facts as attention to architecture or to language? The remnants of these sounds are less decayed than the buildings best preserved of the ancient world; nay, they are as fresh as when they were new, probably; the latest and the oldest are one. And is the sound in Schleswig not as new as that in Scotland? Yes, but its permanency there is shewn by the descendants here having the same; they must have been the same at the time of separation. There is much to learn in this; we may find ancient ruins in the sounds of a voice, and study the character of the past in the tones of the most ignorant of the remnants. It is like a spirit unseen but unhidden, a link between the past and the present, that no one can break. I hope that travellers in the Scandinavian lands may throw more light on the subject.

The Tongue not Essential to Speech.

A gentleman once told me he had that day seen an old woman's tongue amputated by electricity, and when the old body came round, and she was asked how she was, replied "Ay, aw connot spake."

A. H., J.

INDIAN INK.

IF any one of the thousands who daily make use of what is known as "Indian ink" were to have a sudden access of curiosity as to its history and manufacture, he would find but little information even in the well informed and erudite pages of Watts and Payen. It was therefore, we think, a happy inspiration that led M. Maurice Jametal to compile from native sources a monograph upon the Indian or rather Chinese ink. His book is in French, and has been printed at Paris as a volume of the dainty series known as the "Bibliothèque Orientale Elzévirienne." M. Jametal, following Chinese historians, whose testimony might perhaps not stand an over-severe cross-examination, attributes the invention of ink to Tien-Tchen, who is supposed to have lived between 2697 and 2597 B.C. At this time, we are told, the ink used by the Chinese was a kind of lacquer, which was spread upon silk with bamboo sticks. Afterwards some kind of black stone to which water was applied was employed, and finally, about two centuries and a half before the Christian era, in the province of Kiang-Si they began to make balls of lampblack, obtained by burning a mixture of lacquer, firewood, and size. The new vehicle for literature soon found favour, and the older fashion died out, and not only did poets arise to celebrate the glories of the ink of Kiang-Si, but the province had the distinguished satisfaction of having its industry supervised by an official of the Imperial Court, and of sending an annual tribute of ink for the special use of the Emperors of the Tang dynasty. Towards the close of the sway of that family lived an inkmaker whose name, Li-Ting-Kouei, is still remembered with admiration after the lapse of so many centuries. He was not only famous for the diverse forms, such as swords and cakes, into which he moulded his inks, but also for the honesty and excellence of his manufacture. The indirect services he rendered to literature and learning

were acknowledged in an Imperial decree, which added an honorific syllable to his name. This is the most famous person in the annals of the industry, and though many have emulated, it is held that none have surpassed him. For the production of the lampblack of "Indian Ink" various methods have been employed, but firewood has generally been used in combination with various oily substances. The best ink is said to have an aromatic flavour, and this, we are told, leads some persons to drink it dissolved in water. It has been shrewdly suspected that some part of the Chinese processes now used have come from Corea, if, indeed, that is not the real birth-place of the industry. The Chinese have at times also utilised the cuttle-fish, which has thus become a martyr to literature, if not to science. M. Jametal, in addition to historical data, has given the practical details of the art from an elementary treatise by Chen-Ki-Souen. This book is one of a kind very rare in the literature of China, whose writers as a rule have a profound contempt for all that is practical. We need not follow the worthy author through these details. Fortunately he has not trusted entirely to his own powers of exposition, and the artist whose help he has invoked has, in a series of quaint drawings, given us some interesting glimpses into the industrial life of the Middle Kingdom. The Pantheon of China is so well stocked that no surprise need be felt at the presence in it of demigods whose functions are to guard and preserve the various instruments of writing. The God of Ink was known as the "Prefect of the Black Perfume," and had precedence over the spirit of the Pencil, who had, indeed, only the rank of a sub-prefect, and also over the Genius of Paper, who merely ranked as the Chief of a District. One day, says a quaint legend, an Emperor of the Tang dynasty was at work in his study, when suddenly from a stick of ink that lay upon his table there stepped forth the figure, no bigger than a fly, of a Taouist priest. "I am the Spirit of the Ink," he said; "my title is the 'Ambassador of the Black Fir,' and I am come to announce that henceforth whenever one truly endowed with learning or genius writes there shall be visible the Twelve Divinities of Ink." We regret to add that there is no authentic record of even a solitary appearance.—*Manchester Guardian.*

The Topographical Distribution of the Nightingale.

In the list of counties where the nightingale has been heard (page 18), I see no mention made of Berkshire. I have frequently heard it in the woods around Reading; where it is well known. I have also found nests in the same locality.

"Orion."

I have been much interested in the papers concerning the distribution of the nightingale, and am happy to be able to state that it is very common here indeed. The woods and covers echo with their song on their arrival, and during the nesting time you hear their warning note of purr, purr, from almost every thicket. One keeper told me that while looking for pheasant eggs this spring he found six nests in two hours, which fact, taking into account how hard they are to find proves how common they are. Also a word concerning the article upon the "Diminution of our Migratory Birds." My personal experience for the last two years is that they are on the increase in this locality, especially may I mention nightingales, shrikes, reed warblers, sedge warblers, whitethroats, chiffchaffs, willow wrens, and blackcaps. It may be that this is a favoured spot, owing partly to its proximity to the crossing point, but such is the case. It may also interest some of your readers to hear that for three successive years I have had a white mole brought to me for preservation, and they were all caught within a circle of 100 yards.

I shall be glad to answer any queries concerning this locality, as it is a rich field for the ornitholigist.

W. B. Ellis.

Arundel.

The May Duke.

In the August number of the *Field Naturalist*, Mr. W. E. A. Axon asks, "What was the kind of cherry known as the May Duke?" and he gives an extract from Pye's "Sketches on Various Subjects," Lond., 1797, mentioning this cherry—the May Duke—as ripening in May. Pye observes that this cherry is "either called so from the time of its ripening in some other climate, or ours must be much changed." This cherry, the May Duke, would seem to have been a variety of wild cherry, said to have been imported into this country from France; and if such was really the case, it would undoubtedly ripen earlier in the latter country than in Scotland or England. In the current number of the "Antiquarian Magazine and Bibliographer," extracts are given from an interesting review of M. Michel's "Critical Inquiry into the Scottish Language," which appeared in a recent number of the *St. James's Gazette*. The reviewer, speaking of the French names given to certain fruits in Scotland, and no doubt quoting M. Michel's work, says—"Longavil, or 'longueville,' was the name of a kind of pear which seems to have been imported (into Scotland) by Mary of Guise, Duchess of Longueville (second queen of James V., and mother of the unfortunate Mary, Queen of Scots). The names of two varieties of wild cherry, 'gean' and 'May-duke,' may have been derived, the former from Guienne, the latter (the May Duke) from Mèdoc." Singularly enough, the gean, or wild cherry, which grows so plentiful in the native woods of Scotland and the North of England—and I refer, from my own knowledge, to the abundance of this handsome wild fruit tree in the woods and coppices of Dumfriesshire, Galloway, Cumberland, Northumberland, and Durham—is not noticed in W. S. Coleman's "Woodlands, Heaths, and Hedges." I have read somewhere that the cherry (the cultivated varieties) was introduced into this country from Eastern Europe, or Asia. Yet, looking at the abundance of the gean, or wild cherry, the woods and hedgerows of Scotland and Nohthern England, and its evidently indigenous growth, it is hard to believe it was introduced into Scotland from Mèdoc in France in the days of Mary of Guise. I have a reference in some of my books to the gean, or wild cherry, long anterior, if I am not much mistaken, to the reign of James V. When I can lay my hands on the book in question, I may possibly have something more to say on this (to me at least) rather interesting subject.

Stacksteads, Manchester. HENRY KERR.

Dr. Kaiser's Graphic Shutter.

Dr. Kaiser has exhibited to the Physical Society of Berlin a shutter of some novelty. On pressing a bulb with the hand, two swinging valves before the aperture of the lens are opened, and meet one over the other. Dr. Kaiser claims, moreover, that he can so alter the mechanism of the valves that one acts faster than the other, and in this way he can allow the light falling from the sky to act for a much shorter time than that coming from the earth. The doctor's mechanism is doubtless very ingenious, but the difficulty about the top light may generally be met in a much more simple manner by the use of a sky-shade or camera-peak, such as Mr. England always uses in landscape work.—*Photographic News.*

Pyrola Rotundifolia.

At the June meeting of the Isle of Man Natural History Society, Mr. G. A. Holt exhibited some good specimens, in flower, of *Pyrola rotundifolia* (*var. arenaria*), Winter-green—gathered by him last May at Southport, which he believed to be the only place in the British Island where this variety was met with.

Frogs under Stones.

How long can a frog live underneath a stone or piece of rock? A few weeks ago, whilst walking with a son of mine on Conway mountain, when he began to overturn some of the stones, he came close to where I stood, and tried to lift one that seemed to be embedded in the earth several inches. With much ado he turned it over, and to my astonishment, underneath was a full-sized toad, such as we used to call Iron Billy Toad when I was a lad. I could not see how it had got under, and the stone appeared not to have been moved for years.

Middleton. S. GREENHALGH.

ON GRIFFINS.

BY HENRY H. HOWORTH, F.S.A.

II.

IF these various notices are examined, and those separated which have some claim to authority, we shall find, as is in fact universally agreed, that the ancients planted the home of the griffin in the country beyond the Ural Mountains. Here tradition made them the guardians of the gold, and here is the actual El Dorado of modern Russia, where the gold mines are still worked so profitably, and where the old graves are so rich in golden treasures. This district was, in all probability, also the chief source of gold in early times. Herodotus himself, as Mr. Bunbury says, while rejecting as wholly fabulous the story of the griffins and the one-eyed Arimaspians, admits as a certain fact that by far the greatest quantity of gold came from the north of Europe (under which appellation he includes the tracts on the flanks of the Ural and the Altai mountains), though how produced, he adds, I know not. The abundance of gold among the Scythians on the Euxine, and its extensive use by them, is attested, as we have said, by its occurring so largely in their graves, and as the author just referred to says—"The fact that large quantities of gold were brought from the interior of northern Asia to the coasts of the Euxine is one that admits of no doubt;" and the extent of the knowledge about the regions north-east of Scythia, as Heeren long ago remarked, points to the existence of a well-established caravan route in that direction, which was, doubtless, largely due to these very gold deposits which attracted, no doubt, the large number of fresh colonists to the northern shores of the Euxine, that gave that area its importance as a commercial centre in the ancient world (Bunbury's Hist. of Ancient Geography, i., 199 and 200). Having traced the griffin to its home, we are in a position to come much closer to it, and I will first quote a passage from the famous traveller, Ermann. "It is manifest," he says, "that the Greek information respecting the gold-seeking Arimasps, whom the ancients unanimously assigned to the northern branches of the Ural, referred in reality to some of these temporary dwellers in the western part of the country of the Samoyedes; and well might they credit Aristeas of Proconesus when he related that, on a journey in the north-east of Europe, he collected those accounts from the furthest of the hunting tribes which he had reached. The obscurest portion of his narrative, in which he tells us that the Arimasps seeking metals in the extreme north of Europe 'drew forth the gold from under the grifons,' will be found to be at this moment literally true in one sense, if we only bear in mind the zoologically erroneous language used by the inhabitants of the Siberian tundras. By comparing numbers of the bones of antediluvian pachyderms, which are thrown up in such quantities on the shores of the Polar Sea, all these people have got so distinct a notion of a colossal bird, that the compressed and sword-shaped horns, for example, of the rhinoceros *teichorinus*, are never called, even among the Russian promuishleniks and merchants, by any other name than that of 'birds' claws.' The indigenous tribes, however, and the Yukagirs in particular, go much further, for they conceive that they find the head of this mysterious bird in the peculiarly vaulted cranium of the same rhinoceros; its quills in the leg bones of other pachyderms, of which they usually make their quivers; but as to the bird itself, they plainly state that their forefathers saw it, and fought wondrous battles with it: just as the mountain Samoyedes preserve to this day the tradition that the mammoth still haunts the sea shore, dwelling in the recesses of the mountains, and feeding on the dead."

"Now, if it be not denied that this northern tradition presents to us the prototype of the Greek story of the grifons, while it suggests, perhaps, the intimate connection of both with

the Arab fable of the roc, then it must be allowed to be strictly true that the metal finders of the northern Ural drew the gold from under the grifons; for gold sand lying under the formations of earth and peat, which are filled with these fossil remains, is at the present day a very common phenomenon." Ermann (ii., 87-89), again speaking of the rhinoceros horns found in Siberia, says:—"Thin plates, cut from these horns, are elastic in the highest degree. They are, therefore, sought for eagerly by the Yukagirs, and, like the cows' horns among the Buirats, and resinous wood among the Ostiaks, are used to line the bows. The attention of the people is, therefore, turned upon this memorial of the antediluvian world more than upon any other; and the nomade geologists of the Icy Sea have arrived at the conclusion that these horns are the talons or claws of gigantic birds, which were more ancient than the Yukagir tribe, and in former times fought with the latter for the possession of the tundras. I have already alluded to the way in which this mythus of northern Asia appears to have been transformed into the Greek fable of the grifons. It is now propagated as credulously here in Yakutsk as it formerly was by Aristeas and Herodotus. When I told them of the rhinoceros, they said that they had often heard all about it, but that they always called the horns in question birds' claws, and saw no reason to change their custom" (id. 282). Ermann is not the only author who confirms the view that the ancient stories of the griffins had their origin in the indigenous legends of Siberia about the fossil rhinoceros. Baer tells us that the traveller Hedenstrom, whom he saw at St. Petersburgh after his return from Siberia, in 1830, spoke of the horns and skulls of the rhinoceros he had with him as the claws and skulls of great birds, and apparently remained unconvinced by Baer's arguments to the contrary, since he reasserted the fact in his later writings (Bull. St. Peters., Acad. x., 254-5).

The horns referred to belonged to the *rhinoceros tichorhinus*, and, as Ermann says, are much larger than those of any living rhinoceros. One of those he brought back with him was bent back almost in a circle. It had a diameter of eight inches at the base, in one direction, the longitudinal one 12½ inches, the other being of a flattened contour, and formed like whalebone or Spanish cane, of filaments or thick hairs, lying parallel to each other, and easily separable. The horns are externally triangular, and have a cylindrical canal inside. When first taken out of the ground they have a dull and woody look, but in water they become bright and translucent, and the smell of horn they give out when burnt reveals their true nature. From the roots to the points of the horns there are, at regular intervals, strange looking rings, within which the fibres are bent in a waving line, and seem to be more loosely united. These mark periods of periodical growth (Ermann, 380 and 381). In these various characteristics the horns simulate very closely the claws of birds.

It is not strange that, with these romantic surroundings, some of these horns should in early times have found their way to Europe as great curiosities, and should have been proportionately prized. It is more interesting to find them currently described as griffins' claws. Eginhardt, the biographer of Charlemagne, tells us that his master, in the year 807, received as a present from the Khalif Harun ar Rashid, the horn of a unicorn and the claw of a griffin. These were long preserved at St. Denis, and were described in a work published at Paris, in 1646, entitled "Le Tresor Sacré de St. Denys ou inventoire des Sainctes reliques, etc." Among the objects described in this work is a griffin's claw, set on a griffin's foot, made of silver gilt, having at its point a small ball, on which was a bird. The whole, except the claw was of silver gilt, ornamented with an amethyst. This piece, says the description, is admirable, for the claw is quite natural, and so large and wide that in its hollow it holds a pint of wine of the measure of St. Denis,

whence it may be judged that the griffin, or other bird to which this claw belonged, was of a prodigious size. With it was a piece of licorne 6½ feet long, and probably the finest in Europe. These objects, which had been sent by *Aaron*, King of Persia, (sic) to Charlemagne, with other rich presents, had been presented by his son Charles le Chauve to St. Denis (op. ut 125 and 126). The horn of the unicorn here mentioned was made the subject of an elaborate inquiry at the Hague, in 1646, described in Churchill's Collection of Travels; when we are told it was altogether like a similar one at Copenhagen, and that the Danes were of opinion that these kind of horns, found in Muscovy, Germany, Italy, and France, came from Denmark. The Danes sold the horns as unicorns' horns. The one at St. Denis had the same root as the rest, hollow and worm-eaten at the end, like a rotten tooth. "This being granted," says the old writer, "as it is really true, I will positively assert it to be a tooth fallen out of the jawbone of the same fish known in Iceland by the name of narwhal, and that consequently it is no horn." It is clear that the present received by Charlemagne consisted of a narwhal's tusk, and the horn of a fossil rhinoceros. It is very probable that the former, as well as the latter, came from Siberia, for although the narwhal is not mentioned among the animals killed in the seas about Nova Zembla, Schmidt, in his recent journey to the Yenissei, saw such a narwhal's tusk in the possession of a fur merchant named Sotnikof, at Dudino. To return to the griffins' claws, we find similar specimens to that at St. Denis preserved in the sacristies of churches at Vienna, Wittenberg, and Halle. The treasures at Vienna were described by Winterburg in a work published in 1502, with plates. *Inter alia* are a griffin's claw, with a figure of St. George upon it; two griffins' claws, set in silver, etc. A description of similar treasures at Wittenberg, with engravings by Cranach, was published in 1509, where we read *inter alia* of a griffin's claw, with a figure of St. Thomas, containing 39 relics; another with the image of St. Leopold. A similar description of the treasures in the churches at St. Moritz and St. Mary Magdalen at Halle, published in 1520, also with engravings by Cranach, mentions a griffin's claw set in silver gilt. A so-called griffin's claw, with the inscription "Caspar Melchior Balthasar" on the rim, and standing on three small gilt claws, is to be found in the Royal Treasury in that country (Olfers, Abhand, die konigl. Akad. des Wiss. zu Berlin for 1839, pp. 62 and 63, notes).

We have now completed our task, which was to try and explain the origin of the myth of the griffins. It is curious to trace it to the fossil remains of the rhinoceros found in Siberia, which the imagination of the natives has exaggerated into relics of gigantic birds, and more curious to be able to conclude from the appearance of griffins on Egyptian and Greek works of art of a very early date, that intercourse between Siberia and Europe must have been carried on at the very dawn of human tradition.

Chemical Affinity.

Will some one tell me how to get from the following difficulty, or if there is none, where my error is? It seems that not being able to draw the line between chemical affinity and the affiinity implied by solubility; and the affinities indicated by solubility on the one hand, and absorption on the other, that I have considered all facts of this kind as appertaining to chemical affinity, an extreme case of this kind is the absorption of moisture by paper.

A. R.

A Bouquet.

BY W. H. MALLOCK.

I brought my love at eve a mass of flowers
That I had sought throughout the morning hours:
Brought all that I could find of bright and sweet,
And trembling laid them down before her feet.

She passed the tulip's pride, the rose's glow,
To choose a bud that scarcely dared to blow;
And said, with kindness beaming in her eyes,
"I take the flower that others will despise."

From "Songs and Rhymes, English and French," by W. H. Mallock. (Remington and Co.)

Character in Handwriting.*

"The more I compare the different handwritings which pass under my observation, the more I am confirmed in the idea that they are so many expressions—so many emanations from the mind of the writer, by which you can judge of it."—*Chateaubriand.*

As the mind of an individual may be traced in the shape and peculiarities of his body, the expression of his countenance, and the tone and modulations of his voice, so it is but natural to suppose that the characters drawn by him in writing should form, in some degree, an index to his character. It is a well-known fact, that each nation has a general style of caligraphy, by a knowledge of which we may tell a person's nationality, without the assistance of language; why, then, not go further, and, by close study and observation of their handwritings, read for ourselves the characters of those with whom we are daily and hourly brought in contact? In order to do this with success, it is necessary to take into account many modifying conditions, without the consideration of which it would be more than useless our attempting to read character in this manner. A brief mention of this will suffice.

"Each profession and occupation," says an eminent writer on Physiology, "has a tendency to impress its peculiar lines upon the physical system of those habitually exercising it; so that we may generally know a man's trade by the cut of his features." The same remarks may be applied with equal force to handwriting. In many cases, we find a great similarity in the handwritings of persons of the same trade or profession; and, in such cases, it is little use attempting to read the character.

A few persons never write any other hand than that originally taught them by their parents or teachers. If there be any character in such, it will be that of the teacher and not of the writer, who, in all probability, will have but little to exhibit, save a want of originality and self-dependence.

The handwriting of some people is hardly ever twice alike. A new style strikes their fancy, and so they adopt it. They imitate whatever please them, and, with the exception of a dominant spirit of imitation, their handwriting, as a sign of character, is valueless.

Pope has said

Most women have no characters at all;

and, though unwilling to admit this, we must confess that there is a much greater similarity in the handwriting of women than in that of men. We are, however, inclined to ascribe this to the fact that, generally speaking, woman is less independent, vigorous, and bold than man; and ever more willing to be led than to lead, and to be instructed than to instruct. In studying the handwriting of women, more attention should be paid to the *peculiarities*, than to the general character of the style: where no peculiarities exist, no strong trait of character will be found.

Taking into account these modifications, we shall find but little difficulty in reading character from handwriting. All that remains to be done is to learn the indications of the various styles; this, however, can be accomplished only by the closest study and observation. The following table, containing the different styles and their indications, may be useful.

STYLE.	INDICATIONS.
1. Plain and legible.....	Calmness, carefulness, industry, intelligence, steadfastness.
2. Dashing and illegible.....	Impatience, hastiness, excitability, enthusiasm, often genius.
3. Fine and regular	Calmness, patience, self-control, taste, good sense, neatness.
4. Coarse and irregular.....	Impatience, untidiness, indecision, sometimes energy or talent.
5. Rounded and measured ...	Calmness, clearness, order, ingenuity, perseverance, deliberation, steadiness.
6. Large and bold	Independence, perseverence, patience, liberality, firmness of spirit.
7. Angular and pointed	Independence, vigour, resolution, talent, ingenuity.
8. Precise and formal	Order, formality, resolution, often want of feeling and narrow-mindedness.
9. Small and weak.....	Cautiousness, lack of resolution, timidity, indolence, weakness of mind or body.

* For much of the information contained in this article, I am indebted to a work on "New Physiognomy," by Samuel R. Wells.

10. Ornamental .....Enterprise, ideality, lack of taste and intellect, hopefulness.

I do not say that these will be found correct in every instance, but they will at least serve as a foundation for further observations. If these observations tend to prove that there really is something more than is at present supposed in reading character from handwriting, my object in writing this short article will be fully attained.

T. P. Dotchon.

Plant and Bird Nomenclature.

Under this head a complaint is made by Mr. Holt of the many names given to the same bird or plant. It seems to me that Mr. Holt, in his desire to correct others, errs a little himself. The true student of nature will be neither perplexed nor deterred by the nomenclature, for he will hope to study the plants themselves, and he will find that the various names have not been given arbitrarily, but each contributes a little information about the plant. To take the instance he gives. "Ground Ivy" and "Robin-run-i'th'-hedge" are admirably descriptive names for the plant *Nepeta glechoma*. So is "Ragwort" for *Senecio Jacobæa*. "Kettledock" has no descriptive meaning apparently; but it is a local name for the plant, and is as accurate as any other name so long as it serves to indicate the right plant to the people who use it. Since all the names ever given to any plant, especially the Latin or scientific names, have some meaning, a study of the various names really adds to the human interest of the plant, and takes nothing away from the interest of the structure of the plant itself.

I am by no means clear that the writer of the little work on "Wild Flowers," published by Ward and Lock, is as inaccurate as Mr. Holt supposes. *Nulens* is of course a misprint, but I believe the name hare bell is in some districts applied to *Scilla nutans*. The description given is quite accurate as applied to the "hare bell squill" with its pendulous *sweetly scented* flower. It is quite clear that the writer was not thinking of *Campanula rotundifolia*, the English name of which, I believe, is not *hare* bell, but *hair* bell, from the hair-like character of its flower stem.

Aug. 4th. 1882. Rosa.

ON ERRORS IN THE POPULAR NAMES OF PLANTS.

BY R. ALEXANDER PRIOR, M.D., F.L.S., &c.

MUCH confusion has risen from a misapplication of the popular names of our plants. To correct several mistakes of this kind, the Council of the Royal Botanic Society has decided to exhibit some of the species, the names of which have been transferred to others to which they did not originally, and do not properly belong; such as the Deadly Nightshade, the Bulrush, and the Laurel. There are some to which a false name has irretrievably passed over, and then adopted into the language as the proper name of the plant, as the Privet, for instance, the Laurel, the Gilliflower, the Forget-me-not, the Primrose, the Heart's-ease, and the Whort, and there are, as may be seen in Britten and Holland's work, not a few which are differently applied in different localities, such as Hare-Bell and Blue Bell. Upon these I have subjoined a few remarks.

Deadly Nightshade.—By all our writers, popular and scientific alike, for centuries past, this name has been uniformly given to its rightful claimant, the *Atropa Belladonna*, *L.*, which seems to have been formerly a much commoner and better known plant than it is at present. Of late years, since the Belladonna has become scarce, its alarming title has in many parts of England passed over to Bittersweet, the *Solanum Dulcamara*, *L.*, and children have been cautioned against its tempting scarlet berries as highly piosonous. The real Deadly Nightshade is herbaceous and upright, and bears campanulate flowers and fruit of a jet black colour. The Bittersweet, *Fr.* Douce amère; *G.* Bittersüss, is a twining shrub, with clustered potato-like flowers, and scarlet berries.

Bulrush.—This is a name that is even more frequently misapplied than that of the Deadly Nightshade, being given in popular parlance to the Cat's tail or Reed mace, the *Typha*

latifolia L. Agricultural drainage and cultivation have not yet rendered the right species a rare one, and it is quite inconceivable how this name of "Bulrush" has been transferred to the stiffest and most upright of British plants, and one that so little answers to the character of it embodied in the phrase: "to hang the head like a bulrush," and, with its large conspicuous leaves, so little like a rush in any respect. The right one is the *Scirpus lacustris L.*, and takes its name, not from the quadruped, but from *pool*, to indicate that it is the rush of stagnant water, Fr. *jonc des etangs*.

Laurel.—The shrub so called at the present day is really a cherry. That of the ancients, and of poets,

> The laurel, meed of mighty conquerors
> And poets sage;

and which by Latin writers was called *Laurus*, is now more generally known as the Sweet Bay. In French also the two shrubs are confused under the name of *Laurier*.

Hearts-ease.—This name was appropriated to the Pansy, was by old writers given to the Wall-flower, in the sense of a cardiac or cordial. Both these very different plants fell under the comprehensive group of Viola, and it is likely that the confusion has risen from a misapplication of this equivocal term. In William Turner's Herbal of 1562, pt. ii., p. 163, it is assigned to the Wall-flower, in Lyte's of 1578, p. 151 and 152, to both these plants.

Primrose.—The name does not mean "first rose," as explained in some popular books, but is a corruption of *Pryme rolls*, a word formed from Fr. *primeverole*, and this from It. *primaverole*. dim. of *prima vera*, as denoting the first flower of spring, and in old authors is given to the daisy, which in Latin herbal is called *Primula veris*. In Italy the daisy is the first flower that opens, and the primrose a rare plant. Chaucer and Gower by *primerole* mean this later, our present primrose.

Forget-me-not.—This name, for a period of more than 300 years, as we may see by Lyte's Herbal of date 1578, p. 28, was given to the *Ajuga Chamæpitys, L.* It was only in the early part of this century that it was transferred to a plant with a pretty blue flower, the *Myosotis palustris, L.*, one that had previously been called "Mouse-ear Scorpion-grass," and the story of the drowning lover got up to explain it. It is unknown in what work this change of name is first recorded. Up to 1821, when Gray's "British Plants" came out, the *Chamæpitys* is called "Forget-me-not," and the *Myosotis* "Scorpion-grass." Continental writers began about the same time to give to this latter names of the same imports, Fr. *Ne m' oubliez pas*, G. *Vergiss mein nicht*, Da. *Forglemn mig icke*.

Gilliflower.—This name is derived from It. *garofolol*, which was given in Italy to plants of the Pink tribe, and more especially to the Carnation, in reference to their odour of cloves. It was subsequently extended to several sweet-scented Cruciferæ, and in this country became appropriated to them, but of late years seems to have almost dropped out of use. It is scarcely necessary to say that the explanation of the word as *July-flower* is a mistake.

Blue Bell.—The flower, which in England is usually so called, is the familiar wild hyacinth, the *Scilla nutans, Sm.* The one which Scotch poets mean, is the little bell flower so common on downs and heaths, the *Campanula rotundifolia, L.*

Hare Bell.—There is the same confusion with this word as with Blue Bell. In England it usually means the *Campanula rotundifolia;* in Scotland the *Scilla nutans;* but in different localities the usage differs. Generally speaking, in England the *Scilla* is "Blue Bell," and *Campanula*, "Hare Bell." In Scotland, the *Campanula* is "Blue Bell," *Scilla*, "Hare Bell."

Whortle-berry and Wort.—These words, from the Latin *myrtilli* and *myrti*, myrtle-berries, are now applied to the fruit of the *Vaccinium Myrtillus, L.*, from the resemblance

to that of the Myrtle, which was formerly imported from the Mediterranean countries, to be used in cookery.

PRIVET.—Little as it might be suspected, this name once belonged to the Primrose. It was altered to its present spelling from Prymet, a corruption of Primprint, a word derived from *prime printemps*, as meaning the first flower of spring, and exactly corresponding to the French *premevére*. It was a qestion with herbalists to which plant the Latin term, *Ligustrum*, properly belonged: whether to the shrub that we now call Privet, or to the Primrose, and through this confusion the name of the latter has passed to the former.

NOTE ON THE PRECEDING ARTICLE.

BY WILLIAM SOWERBY, SECRETARY ROYAL BOTANIC SOCIETY.

IN furtherance of Dr. PRIOR'S object we prepared a Group of Plants in illustration of his remarks, they were arranged near to the Wild British Flowers exhibited at the Gardens on July 5th. The Plants mentioned in Dr. PRIOR'S paper flowering at far distant periods of the year, only some of them could be satisfactorly exhibited at the time—among those in the group were:

CLASSIC LAUREL, SWEET BAY, *Laurus nobilis.*
LAUREL, OR CHERRY LAUREL, *Prunus Latrocerasus.*
DEADLY NIGHTSHADE, *Atropa Belladonna, L.*
WOODLY NIGHTSHADE, OR BITTERSWEET, *Solanum Dulcamara, L.*
BULRUSH, *Scirpus lacustris, L.*
REED MACE, OR CAT'S TAIL, *Typha latifolia, L.*
BLUE BELL, *Campanula rotundifolia, L.*
PRIVET, *Ligustrum vulgare.*

The subject is no doubt highly interesting, especially to those who delight in hunting up the history of peoples, nations, and tongues the study should be divided into two or more groups: first, those popular names of Plants which have in time become changed, mistaken, or missaplied, either by erroneous translation of language or substitution of one plant for another, such as the Paper Reed of Egypt and the Scriptures. *Papyrus antiquorum*, is translated into BULRUSH, and represented in pictures by *Typha latifolia*, a plant, I believe, never did or could grow or live in the Nile. Again, the CHERRY LAUREL. *Prunus Laurus cerasus*, has no doubt usurped the name from the leaves, although poisonous, possessing an aromatic property somewhat resembling that of the Sweet Bay. The second division, those names which from time to time may have been applied to plants for special reasons, attributing virtues, or peculiar characters or forms suggesting the popular idea, and easy of retention in the popular memory. Probably our forefathers having to hunt up their ordinary vegetables and simples in the wild fields, found it useful to remember a bitter acrid herb by the name of Forget-me-not, but we of more tender culture may be allowed to amuse ourselves with, and remember the love tales of our childhood by linking them with the pretty flowers of our country lanes, and thus instead of calling our special favourite *Myosotis* by that of "Mouse-ear," or "Scorpion-grass," which only describe forms of parts alike common to many plants, but have no pleasant poetic rhythm, we dub it FORGET-ME-NOT, and immediately it responds to our inward self.

The same plant often receives district popular names to describe portions of itself, such as "Mouse-ear," for the leaf, and "Scorpion-grass" the form of the flower spike of *Myositis*. From childhood I was taught that the name HARE BELL was given to the wild Hyacinth (*Scilla nutans Sm.*) from the drooping spike of flowers resembling the foot of the Hare, and HAIR BELL, or BLUE BELL, to *Campanula rotundifolia*, its pretty little blue Bell flowers hangiug and swinging gracefully in the breezes, suspended by a delicate hair-like stalk.—*Quarterly Record of the Royal Botanic Society of London.*

THE JACKASS PENGUIN.

BY R. E. HOLDING.

ONE of the most noticeable additions to the menagerie of the Zoological Society's Gardens this year is the subject of the illustration, the Jackass Penguin (*Spheniscus Magellanicus*). It was purchased 25th May, and is the first living example of the species that has so far been obtained.

The extraordinary and grotesque bird known by this uncomplimentary name is exclusively an inhabitant of the antarctic regions. It lives, as its specific name indicates, in the Straits of Magellan, and its immediate neighbourhood, including the Falkland Islands, where it would seem, however, to be somewhat rare, only one example being obtained by the Challenger Expedition, during their stay. This is figured, and described in the "Report on the Birds," &c., recently issued. Penguins associate in rookeries or colonies, numbering from few hundreds to many thousands. Mr. Moseley, in his "Notes by a Naturalist," says that on the Island of Tristan d'Acunha alone there could not have been less than 400,000 of the Rock Hopper Penguin (*Eudyptes Saltatar*). They construct their primative nests on the clefts or under the ledges of rock or huge stones, or where the conditions permit, tunnel or burrow on the sandbanks to various depths—one dug out in the Falkland Islands being nearly eight feet in length. A singular circumstance noticed by several naturalists, but as yet unexplained, is the deposit of innumerable quantities of moderate sized stones in and about the entrances to these burrows. The seal hunters say they are the ballast taken in by the Penguins on entering the water, and disgorged on landing to proceed to their burrows. I fancy this statement must be requiring to that enormous mountain of "notes regarding further confirmation." It seems strange that the act, if it does really occur, has not been noticed by others. The food of the Penguin, as will be readily inferred, is almost exclusively marine, and consists of fish, molluscs, crustacea, and probably land-shells, and the tussock grass everywhere abounding in the inaccessible islands. Two large greenish white eggs are laid, and both parents share the troubles of incubation. The young and quaint little fellows soon become remarkably tame, and follow the owner about in the erect position, running and walking and greatly resembling a diminutive child. It is well, however, not to be too hasty in making overtures of friendship, or they will be resented by a beak, to whose sharpness I can personally testify. Some interesting observations relating to the rapidity of the moult in the Humboldts Penguin are recorded by Mr. A. D. Bartlett, in the proceedings of the Zoological Society for 1879 (*p.* 6), the whole process occupying less than ten days. Owing to frequent and rapid steam communication with

THE JACKASS PENGUIN.

the countries inhabited by this singular group of birds, the Zoological Society have within the past few years obtained a specimen of the King Penguin, Gentoo Penguin, Black fooled, Humboldts, and Rock Hopper Penguins. Several of these, as well as the "Challenger" series of Penguins, have been placed under the care of Prof. Morrison Watson, of Owens College, Manchester, and some valuable results from his investigations as to their structure and anatomy are anticipated by zoologists.

Do Fishes feel pain?

I think the answer to this query (*Field Naturalist*, vol 1, p. 34) should certainly be in the affirmative. The sense of feeling appears to me to be one of the most necessary senses for every living creature to possess, and indeed, if it were not, at least in some degree, possessed by them all, I fail to see that they would have any incentive to keep out of danger. I am afraid that a fish who was absolutely incapable of feeling pain would not come out as one of the fittest to survive in the struggle for life. There are *parts* of the bodies of animals which are incapable of feeling pain, although they are evidently capable of conveying, to some extent, a sense of touch. Take for instance portions of the nails of men, or the shells of the *Crustacæ*. I will not say that this is impossible in the jaws of the trout, but I think it in the last degree improbable, especially as it is, relatively, near the portion of the body that we generally find located in animals, the delicate senses of sight, taste, and smell. I hardly think the incidents quoted by your correspondent "F. S." from the *Academy* exactly bear upon this question. It would of course be quite unreasonable to suppose that because a trout took, at various periods in its life-time, several artificial minnows with the accompanying hooks, and was caused pain on these occasions, he would abandon a natural instinct, and cease feeding upon minnows forthwith. If the trout referred to at p. 34 had taken all the hooks in one day the incident might be admitted as an argument in favour of the opinion that fishes cannot feel pain; but no such statement is made by the correspondent of the *Academy*, and it is very reasonable to infer that they had been taken on widely distant dates. I hardly think the subject merges into a question of "insensibility or stupidity"—the perfection of the artificial minnows and the skill of the angler must be admitted to have *something* to do with the bait being so often taken. The question is an interesting one, and might with advantage be argued in the pages of the *Field Naturalist*.

W. J. V. Vandenbergh.

August 3rd, 1882.

The Science of Handwriting.

My second cousin, who is a proof reader, has sent me a South African newspaper which contains these verses:—

A PRINTER'S PROTEST.

Oh, why do people form such a's and finish off such b's—
Why do they make such crooked c's and such confounded d's?
Why do they form such shocking e's, and f's with ague fits?
Their g's and h's are too much for any printer's wits.
What a human eye is without sight is an i without a dot,
J's are such curious, crooked things, we recognise them not.
K ought to stand for kindness; but comes in well for kick.
L's and m's are mischievous, while n's just raise Old Nick.
O's are rarely closed at all, and p's are shaggy things.
Q's might as well be spider legs, and r's mosquito wings,
Some people make a passing s who never cross a t;
Others use the self-same strokes to form a u or v.
W's get strangely mixed; x's seem on a spree.
Y is a skeleton on wires. Zounds, how we swear at z!
And yet, just think what typo's get from drivers of the quill!
They call us such a careless set, and scribble on at will.
Well, they will scribble, and we must swear, and vainly try to please,
Till they go back to school and learn to make their a, b, c's.

In the interests of accuracy the above protest and plea is commended to the world of science by

Manchester. Diabolus Typographicus.

THE LITERATURE OF THE TROCHILIDÆ.*

BY DR. ELLIOTT COUES, U.S.A.

HUMMERS were of course unknown to the ancients, where τρόχιλος or *trochilus* is believed to have been one of the Plovers (*Charadriidæ*). Misled by the false analogy of small size, slender bill, and glittering plumage, some comparatively modern authors have confounded these exclusively American birds with certain Old World forms, as the *Cinnyridæ* for instance. But as a rule the *Trochilidæ* have been recognized as one of the most perfectly circumscribed groups in ornithology. The literature of the subject dates back to the "heroic age"; the first mention of any bird of this family is said to have been made in 1558, and can scarcely have been earlier. Scattered notices of such birds appeared in various works relating to America during the remainder of the 16th and the whole of the 17th century; but it was not until toward the close of the latter that special papers upon the subject appeared; the oldest one which I have seen dating 1693, when Hamersly† described the "American Tomineius" in the *Philos. Trans.* The 18th century gave us almost nothing of this kind; but notices multiplied in various historical, geographical, and narrative works relating to America; while during the latter half of this century—that is to say, in the Linnæan period—several formal accounts of *Trochilidæ* formed a part of the systematic treatises on ornithology; notably, those of Linnæus, Brisson, Buffon, Gmelin and Latham; but the sum is small and the substance meagre of all that was learned of the birds prior to 1800.

In 1758, when Linnæus applied his system consistently to birds, in the x. ed. of the *Syst. Nat.*, he used the classical word *Trochilus* for a genus co-extensive with the modern family *Trochilidæ*, and catalogued 18 species, mostly based upon descriptions or figures furnished by Seba, Brown, Sloane, Catesby, Edwards, Clusius, and Albin; with references also to the *Mus. Ad. Fr.* In the xii. ed., 1766, this number was increased to 22, with many additional references, as to Marcgrave, Willughby, Ray, and especially Brisson.

In 1760, the last-named famous ornithologist gave us what may be deemed the first extended, or in any sense "monographic" account of *Trochilidæ*. Studiously collating the already numerous notices scattered through works of the character I have mentioned, as well as through the illustrated and other natural history treatises of his predecessors in ornithology, he was enabled to describe with his customary elaboration no fewer than 36 species, and to present a copious bibliography. He also made the first tenable genera of Hummers after *Trochilus*, dividing the whole family into two groups, *Polytmus* and *Mellisuga*—one containing large species with curved bills, the other small species with straight bills. In this action of Brisson's we see the origin of the curious fashion which so long endured among French writers—that of distinguishing "Colibris" from "Oiseaux-mouchès" among *Trochilidæ*. It is also notable as the starting-point of a generic subdivision of the group which was destined at length to reach the farcical and scandalous extreme of some 350 genera for few more than 400 known species.

In 1779, Buffon adopted the same two divisions of "Colibris" and "Oiseaux-mouches," presenting 19 species of the former, and 24 of the latter group; a total of 43 *Trochilidæ*. If we except the mere naming and describing of some additional species by Gmelin and Latham, nearly all that had been learned of the birds up to the close of the last century

* This article forms a note in Dr. Coues' "Third Instalment of American Ornithological Bibliography (*Bulletin of the United States Geological and Geographical Survey of the Territories*, vol. v., p. 690.)

† By a clerical error, and my own oversight, this paper stands accredited to Dr. Grew. Winthrop's earlier (1671) paper in the same *Trans.* does not relate exclusively to the Humming-bird.

was reflected in the works of these two famous French authors.

In 1788, the industrious but indiscriminate and incompetent compiler of the xiii. ed. of the *Syst. Nat.* produced a total of 65 species of *Trochilus*. None were described except at second-hand, but to many of them binomial names were first affixed. Two years afterwards 65 species of *Trochilus* were recorded in the *Ind. Orn.* of Latham.*

We are thus brought, by the stepping-stones of but few works requiring special mention here, to the opening of the 19th century, which saw Audebert and Vieillot's luxurious work, *Ois. Dorés*, perhaps the first ornithological work which undertook to reproduce metallic reflections of plumage. The feathery Iris of these exquisite creatures is always fascinating, and there are no more favourable subjects for glittering plates. The work, indeed, was not exclusively a monograph of the Hummers, but the *Histoire Naturelle des Colibris et des Oiseaux-mouches* formed a large part of the undertaking. Scientific names were not used in the *Ois. Dor.*; but a technical nomenclature of the subjects of the work was furnished by Vieillot in 1817.

The first great illustrated work on Hummers exclusively was Lesson's, published in parts, from 1829 to 1832, the parts being afterwards grouped in three separately titled volumes. This author described and figured in colours upwards of 100 (about 110) species, many of which were actually new, and to many more of which new names were given. A very few genera, additional to or in place of Brisson's, had meanwhile been proposed; but Lesson was the first to introduce any considerable number of new generic names. Many of those, however, which Gray and others have since cited as generic, were certainly not used or intended as such by Lesson, being simply vernacular designations of certain "tribes" and "races" among which he distributed the *Trochilidæ*; such words as "Bleuets" and "Queues êtroites," for example. French authors were (and I think many of them still are) such sinners in spelling that it is not always easy to say what words of theirs they would have us take as technical. Possessing a copious and voluble vocabulary, largely supplemented by gesture-speech, or shrug-language, and violating in their articulation the usual powers of written characters, they not only acquired a trick of Gallicizing technical words, but they also cultivated a characteristic habit of rising superior to orthography. If Vieillot could write *Cripsirina* for *Cryptorhina* without flinching, we need not wonder that Lesson invented *Ornismya*, which he defended as against *Ornithomyia*, or that some of his successors reached the height of *Ornysmir!*

The Hummers have always been objects of study peculiarly agreeable to French ornithologists. Their daintiness, so to speak, seems to suit the national genius. French literature, therefore, figures in the written history of these birds to an extent greater than that observable in any other family of birds. About the time we have reached, however, several English names became prominent in the present connection: as those of Swainson, Vigors, Loddiges, and especially Jardine—for Gould had not then begun the work which was afterwards to indentify his name with Trochilidine literature. Swainson had already classified the Hummers as a part of his general scheme, describing some new species and establishing certain genera. In 1833 and thus upon the heels of Lesson's memoirs, Sir William Jardine prepared his monography, to the valuable and agreeable text of which Lizars contributed beautiful illustrations. The home of the Hummers was heard from the same year in La Llave's *Memoria*; and Schreibers's *Collectanea* of same date consisted only of these birds. From this time until the beginning of Gould's great work in 1849 appeared no monographic treatise on

* The viii. vol., 1812, of Shaw's *Gen. Zool.*, gave 70 species of *Trochilus*.

Trochilidæ. But the period was one of great activity, among both English and French writers; the accumulation of material was rapid and incessant, and many papers of these years described new genera and species, though too often hastily and inadequately. In England, Gould and Fraser were busy with their materials. In France the writings of Lesson continued; Bourcier became prominent in the number of his papers; while Boissoneau, De Lattre, Gervais, Longuemare and others made their respective contributions. This was the period of accumulation rather than of elaboration; numberless new names were introduced, but among them were many synonyms, both generic and specific; little or no systematic revision of the subject being effected, unless Gould's *Draft Arrangement*, the precursor of his *Monograph*, be considered of such character.

The thirteen years, 1849-61, during which Gould's work was pending, marked the next period in the history of the subject. The preparation of this great work held its author, already recognized as the leading Trochilidist, to his subject; and the appearance of successive parts served as a continual stimulus to others to move in the same direction. The author published many papers describing cursorily new objects about to be depicted in his magnificent folios; and several French ornithologists, notably Bourcier and Mulsant, were little behind him in this respect. The period was also marked by the appearance in England of Martin's *General History*, in some sense a continuation of Jardine's work. It was furthermore characterized by the malignant epidemic which we may call the genus-itch; which broke out simultaneously in 1849, from two foci of contagion, in France and in Germany, and proved disastrous in the extreme. The infection reappeared in an aggravated form in 1854, and Trochilidine literature has never entirely recovered from its effects.

Many genera of Hummers, notably Swainson's, Lesson's, and Gould's, had been found acceptable, and, indeed, necessary; but the most embarrassing results attended the steps of some authors who coined names on the glancing of a feather in this beautiful group of birds. As just stated, serious difficulty began in 1849, in those parts of Bonaparte's *Conspectus* and of Reichenbach's *Systema* which treat of *Trochilidæ;* and in 1854 each of these authors increased it immeasurably, the one in his *Tableau*, the other in his *Aufzählung*. But I have on previous pages sufficiently commented upon this matter.

The completion of Gould's splendid monument closed this period of accumulation. The subject had grown rapidly, and had become unmanageable. Some authors had simply amused themselves in "playing chess" with the names of Hummers, and many had pressed forward with new species upon insufficient examination of known material, or inadequate regard for what others had published. The fog of synonymy had completely enveloped the subject. It was hazardous to enter it, and it seemed almost hopeless to attempt to lift it. The *Monograph* represented, therefore, rather a broad and secure basis for future investigation than any final accomplishment. It gave a series of 360 coloured plates of about as many species, red or nominal, with accompanying descriptive letter-press; other species added, in the *Introduction*, raising the total to 416, referred to 123 genera. But many new names, generic and specific, were still to see the light; many others were to sink into synonymy; the nomenclature was still shifting; in short, studious and judicious systematic revision of the whole subject was imperatively demanded. If Gould's work made this necessity apparent, it also immeasurably contributed to the desired result.

Previous to this Gouldian period American writers did next to nothing for the special literature of the family; but during this time, and subsequently, many new species were described by Lawrence. In 1860, and therefore just

before the period closed, Germany brought a fascicle of the *Museum Heineanum* to bear upon the subject, many new genera, and some new species being described by Cabanis and Heine. In 1863, the *Trochilidica* of the last-named author appeared in the *J. F. O.*, with a similar result. In 1866, MM. Mulsant and Verreaux's *Essai d'une Classification Méthodique* appeared as the precursor of a more elaborate work then contemplated, containing fresh accessions to the number of genera with which the family was destined to be burdened, and a re-arrangement of the whole group. This decade, 1861-70, saw also a fair number of minor papers, calling, however, for no special remark here. It represented flood-tide in the mere describing of species, and their re-arrangement in futile genera; the ebb necessarily followed.

The state of the case at that moment was faithfully reflected in Gray's *Hand-list*. This catalogued 469 species, real or nominal, distributed in 163 genera or subgenera, and carrying a load of synonymy amounting in the aggregate to perhaps 800 specific and 300 generic names. This, it will be remembered, is irrespective of the endless combinations of generic and specific names, which, were they counted, might represent a total of several thousand binomial names which have been imposed upon a family of birds consisting of few more than 400 known species, conveniently referable to about one-fourth as many modern genera!

Such a state of things as this inevitably tended towards a healthy reaction; and during the last decade, the accessions of new names have been fairly offset by the reduction of others to synonyms. It is true that the *Historie Naturelle des Oiseaux-Mouches*, of MM. Mulsant and Verreaux, and M. Mulsant's *Catalogue*—these being among the most notable publications of this period—can scarcely be regarded as tending in this direction, viewing the many additional new names which they present. Having seen neither of these treatises, I cannot judge of their claims to be considered as advancing or improving the science. But it cannot be doubted that the patient and faithful study which Messrs. D. G. Elliot and O. Salvin have of late applied to the amelioration of Trochilidine affairs has done much toward the needed reform. These skilful ornithologists have published numerous papers reviewing different groups of Hummers, under the most advantageous circumstances as regards handling material and examining literature; and their criticisms have been of the greatest service, not only in defining genera and species, but in sifting synonymy and settling nomenclature. Mr. Elliot's labours have borne their final fruit in his *Classification and Synopsis of the Trochilidæ*. However qualified a success the experts may conclude this performance to be, it is certainly a great boon to the working ornithologist, and a faithful reflection of the state of our knowledge respecting the exquisite creatures to the elucidation of whose history it is devoted.

The Kingfisher.

Supplementing Mr. Percival's remarks on the Kingfisher, I may say that I have seen him near mills, where the sound of the waterwheels was loudly heard; and not long ago I saw a fine specimen on the banks of a stream on which the electric light glared from a neighbouring mill. I had a fine bird of this kind brought to me which a cat had caught on its nest, and in this case the pool was dammed up to feed a mill, and had houses (with small gardens sloping to the pool) on every side. Although, for my own observations, I find the Kingfisher is not "far removed from human habitations," yet he is an awkward bird to watch on account of his shyness. NAT.

Mineralogy.

With reference to W. P. L.'s query, the *Mineralogical Magazine and Journal of the Mineralogical Society*, monthly, price 2s., is published by Lake and Lake, Truro, and by Simpkin, Marshall & Co. W. H. G.

FELINE FISHERS.

BY CUTHBERT OXENDALE.

IN the changes which animals undergo in their diet, few cases are more curious than that of the domestic cat. The cat has a strong liking for fish, but singular to say, this strong liking has remained so far what seems to be an incomplete development, for the cat, although it will chase birds through the branches of trees and hedges, and over the tops of houses, abstains from swimming. Few animals are so chary of water as the domestic cat. It avoids rain and wet under all ordinary circumstances, though it will brave the moisture of the tall rank grasses when there is a prey to its taste in view; for instance, a leveret or a young rabbit imbues it with courage to face damp in this form. I do not know that there is any physical reason why the cat should not swim. I have never actually seen a hare swim, but I have heard those whom I can trust say they have witnessed such a phenomenon. But it has been across a canal where the bridges have been far apart, and the hare has been in quest of some particular food, which I believe they can smell a long distance. It cannot be, I suspect, from any defect in the foot, for the dog and the fox are capital swimmers and divers too. The ox swims well with its cloven hoof, though the sheep is no swimmer. I have heard sheep farmers say that the sheep will drown quicker from the tale end than from the head. I have seen cats swim for life when thrown into a pond of water, so that there is no real defect which one would think could not be overcome by an effort, such as the pursuit of a new kind of food might encourage. The nearest voluntary effort at swimming by the cat which I have noticed has been in pursuit of fish. I have seen a cat, whose taste has been educated to fish preferences, sit by the side of a pond, and on a near approach of an incautious "showler" to the shore, pussy has made a dart, and with its sharp claws hooked the silly fish ashore, and secured its non-return. At a mill lodge, where the water is often warm and abounding with fish, and where I had the privilege of angling, and where also my efforts were often rewarded with a take of 80 and 90 head per hour, and sometimes more, the sport has sometimes been divided between myself and some skilful cat fishing as I have described with its own natural angle. To show that the cat has adaptability to peculiar circumstances of life, instances might be given of their rearing rabbits and other animals. But one of the most curious things of this kind that I have known is the following, recently reported from Ulverston. At Broadwood Cottage, the residence of Mr. Hewitson, engineer, a Cochin-China chicken lost the mother bird, when it was taken in charge by a favourite cat, which took every care of the chicken. Subsequently a hen that had hatched two ducklings was killed along with one of the ducklings, when the cat again came to the rescue, and she is now rearing the duckling, sleeping with it, and also walking out with it in the front of the house among the grass. Surely this is the lion lying down with the lamb. If the taste for fish had been old in cats, I think it very probable they would have turned to swimming ere this.

The Stork in Germany.

The following passage occurs in a paper in the *Cornhill Magazine* describing the life of a young lady at a German Cookery School:—The village contained about twenty-four houses, all (except the squire's and the parson's) with a straw-thatched roof, and on nearly every third roof a stork was nested. Those dear storks; what a pleasure they are to every German heart! It seems as if they belong to the family, and no greater joy is ever seen on any face, be it young or old, than on the day when the stork, after a long absence, comes home to his old nest, first of all looking into it, and then, convinced that everything is

in order, beginning to clatter with its bill, giving greeting to all his friends who are standing about beneath, waving their pocket handkerchiefs in welcome. We have a sort of divine adoration for our storks; a stork's nest on a roof is called the greatest sign of luck. No one ever thinks of killing a stork, and if this happens, the crime is punished with from seven to ten years of imprisonment. Never in my life but once have I heard of a stork being wilfully killed. It happened in this village, and often, indeed, have I heard the event talked about. The story is so sad and strange that I should like to tell it here. It took place as follows: "A young man, out of mere boyish wantonness, shot the hen stork some days before they began their long and troublesome journey to Africa. Winter was gone; the stork's nest was again without snow, and the warm sun and mild spring air made people look forward to the arrival of the storks. At last they came. All the nests, except the one which through human cruelty had lost its mistress, were soon full of eggs, which the hen birds were busy hatching. One day a stork which was flying alone towards the village, came to the nest upon the parsonage roof. The female stork, unmindful of approaching danger, was sitting silently in her nest alone, when the strange bird swooped passionately down and began a furious fight with her. She defended her nest, her eggs, herself, as bravely as she could, but at last her strength failed, and the stranger stork succeeded in hacking the eggs to pieces and throwing them out of the nest. Then, but not till then, he seemed satisfied with what he had done, and with a savage rattling in his throat he flew away. The villagers meanwhile stood watching this horrible scene without being able to help the injured mother-bird. This story shows curiously that the feelings and passions both of men and animals are very much alike. The poor stork, pining for its mate who had been murdered, sees another in her full maternal happiness. Mad jealousy comes over him, and being himself unhappy, he wants to make others unhappy too. The wretched bird, it may be added, was never seen again after the tragedy. Most probably he put a speedy end to his own miserable life."

Sense of Locality in Animals.

The sense of locality, spoken of by the Hon. Percy Wyndham (*F. N.* P. vol. i., p. 3), seems to be stronger in the domestic cat than in any other animal. From many anecdotes illustrating this fact, I select the following, which was related to me by a friend, and for the truth of which I can vouch. A gentleman, leaving Whitby for York, took along with him, by rail, a cat which he had possessed some time, and of which he was extremely fond. On reaching her new home, pussy at once began to show signs of uneasiness, and the next day disappeared. Not long afterwards, she arrived at her old home, having accomplished a distance of over fifty miles.

Whitby. T. P. Dotchon.

Heat in Silver Mines.

With reference to a paragraph quoted in the *Field Naturalist* of July, p. 42, on the "Heat in Silver Mines," I would say a few words. The temperature of a human body in health is fairly constant under all circumstances. The temperature of an inhabitant of the Arctic region is the same as of an inhabitant of Egypt. This equable condition is maintained and regulated by a profoundly sensitive system of nerves. Increase of temperature is obviated by radiation and evaporation from the skin. Decrease of temperature, by causing contraction of the cutaneous capillaries, drives the blood to the internal organs, where the temperature is maintained by increased metabolism. Thus a man may stand with impunity in a heated atmosphere that would roast a leg of mutton. The rise of temperature of blood and body mentioned in the paragraph referred to would in all probability prove fatal.

Walter T. Clegg.

Saponaria Officinalis.

Mr. Grant Allen, evidently quoting Bentham, says that *Saponaria* "is wild only in Cornwall or Devon." Richard Buxton, in 1859, recorded *Sa. Officinalis* as plentiful in various localities in the Manchester district. Is it still found there, and is it, and was it always, considered an escape or an introduction?

James Bowker, F.R.G.S.I.

TENNYSON'S "CRIMSON-CIRCLED STAR."

THERE has been much doubt as to the true interpretation of the allusion in the following lines:—

Or cooled within the glooming wave,—
And last, returning from afar,
Before the crimson-circled star
Had fallen into her father's grave.

Dr. W. B. Hodgson asked for an explanation as long ago as 1851. His communication to *Notes and Queries* led to a number of replies. Mr. Robert Snow suggested that it was the crescent moon, encircled by the crimson colour of the sky about sunset, the sun being figuratively considered as the father of the moon. Another correspondent held it to mean the planet Venus, but withdrew this solution in favour of Aurora. "As Aurora rises from the river Aurora, he may be called her father, and as she sinks into the same he may be called her grave." Another, dissatisfied with this explanation, reverted to Venus. Sir James A. Picton has quite recently returned to the subject in a communication to *Notes and Queries*, 6th S. V. 404, from which the following is extracted:—"A few evenings ago, at the seaside, looking westwards over the ocean, I had a beautiful illustration of the poet's fancy. The sun set without a cloud, but with such an amount of haze as made his disc shine like burnished copper. As he descended below the waters a glow of rich crimson suffused the horizon, above which Venus, the evening star, sparkled and brightened as the gloaming deepened, following the sun through the crimson band into the ocean, into which he had apparently descended. Here were at once all the elements of the poet's picture combined, Venus Aphrodite, according to Homer, was the daughter of Jove by Dioné.

Had not his mother Venus, child of Jove,
His peril quickly seen.—(Iliad, v. 212)—*Lord Derby.*

Again—

On her mother's lap
Dioné, Venus fell.

Jove was the Lord of Light, Zeus, Diespiter, Lucetius,
Aspice hoc sublime candens, quem invocant omnes
Jovem.—*Ennius.*

Most readers will be disposed to accept this annotation as a satisfactory explanation of the Laureate's allusion. X.

Jet.

But little attention seems to have been drawn to the fact that the manufacture of jet ornaments, now so extensively carried on in several parts of this country, was a well-known trade among the inhabitants of Europe in very early times.

Charlton, in his "History of Whitby," published 1779, speaks of the discovery of a heart-shaped ear-ring of jet in this locality. "It lay, when found," he says, "in contact with the jaw-bone; and, if any credit be due to antiquity, must assuredly have belonged to some British lady who lived at or before the time that the Romans were in Britain, when ornaments of this sort were universally used." Beads and other trinkets of the same mineral are often found in this district.

Leonardus informs us that the ancient name of jet was Gargates, one of the places where it was formerly procured being so called. It was also known as black Amber. The smoke, made by the burning of it, was useful in driving away evil spirits, dispelling enchantments, &c.; and the substance itself, when crushed and steeped in water, was supposed to cure the bite of a serpent—the more effectually, as we are told, "if mixed with the marrow of a stag."

Solinus and Bede both mention the fact of jet being found in Britain, and many of the "jet holes" in the neighbourhood of Whitby bear evident traces of their having been worked many years ago. Stalactites and stalagmites occur in abundance in some, where tool marks are still to be found.

In mediæval times churches were adorned with polished pieces of jet, and the monks wore rosaries made of this mineral. Young, in his "History," tells us of "John Carlill of Whitby, jet worker, 1598;" and, as far back as 1394, we find mention made in the "Abbey Rolls" of the purchase from Robert Car of seven rings of jet for 7d. (*Itm. p. vij anulis Robo Car de gargate vij d*). And yet we read that the jet trade was commenced about four score years ago!

Whitby. T. P. Dotchon.

POISONOUS PLANTS AND HARMLESS ONES.

BY LEO H. GRINDON.

THE chief purpose and use of botany is the determination of the natures of plants; what kind of service they are capable of rendering to mankind, and in what way can they be made the most of. Very many are of no value, so far as regards direct and immediately available usefulness. A good many others are noxious, and have to be regarded as unsolved problems, since we may be sure that nothing in nature has been created without a purpose, benevolent in the end. A few are distinctly poisonous, and among these, though deadly if used without care, the physician finds some of his most precious instruments for the relief of pain and the cure of the sick. To learn how to distinguish the poisonous, the noxious, the inert, the probably serviceable, is a very simple matter. The requisite knowledge may be acquired without making any attempt to become a learned botanist. The arcana of the structure of plants—the mysteries of "quincuncial æstivation," "spurious dissepiments," and so forth, lie far ahead of all that is really wanted for the enjoyment of useful knowledge of plants. Neither is there any occasion to be master or mistress, in the first place, of the laws of "free cell-formation," or of the manners and customs of "chlorophyll-corpuscles." Insight into these things, partial and approximate at the best, and only then after long and patient study, is one of the magnificent rewards of the experienced student; nothing is more enjoyable; we say merely that it is not wanted in order to make a start in the acquisition of sound, useful, agreeable knowledge of the vegetable forms which give beauty and interest to field and garden. Too many, unfortunately, are frightened away from the pleasant, practical consideration of plants which gives so much charm to one's leisure hours, by the constant putting of these departments of the subject in the very front. Let us see if we cannot get hold of some idea, at all events of the marks of poisonous plants, without first qualifying ourselves to describe the cause of the absorption of fluids by roots, or the mode of the entrance of gases into cells.

Botanists, as all beginners are soon informed by their teachers, as well as by their books, have classified the vegetable productions of our planet into about three hundred "orders" or "families." All the large and important "families" possess some two or three very remarkable and obvious features, and most of the small ones are told, after a little practice, quite as readily. It has been ascertained that in the great majority of the families there is a very considerable, if not an absolute conformity, in regard not only to the ruling structure, but to the properties or qualities of the constituent species. That there should be curious exceptions and inconsistencies is of course no more than would be expected. It remains true, nevertheless, that when we can determine the family a plant belongs to, we acquaint ourselves, at the same moment, with the probabilities, perhaps the certainties, of its nature. The families, it should be observed, are named after the plant contained in them which is best and most familiarly known to people in general. When botanists speak, for instance, of the "Myrtle-family," it means the group of plants which includes the common myrtle, and of which the myrtle, intrinsically, is a capital type or representative. This very family supplies an excellent illustration. It contains a vast number of species, yet in no single instance has there been found the slightest taint, and there seems no reason to imagine that a taint will ever be met with. How shall we tell a myrtaceous plant, and thus, at a single stroke, learn perhaps 2,000 of the good ones our world contains? The leaves are full of translucent dots, indicating little oil-bags; a vein runs up on each side, just within the margin, marking off lateral

portions, like the aisles of a cathedral nave; the flowers, when they appear, are regular, with five petals and many stamens, the latter seated upon the summit of the ovary, or rudimentary seed-pod, this being below the flower. So with the mallow-family, another of the very large ones, and in every instance innocuous. The leaves grow singly upon the stem; the flowers are regular, with five petals, and many stamens, the slender filaments of which adhere in such a way as to form a sheath around the long styles. Other families, totally exempt from anything harmful, are those named after the rose, the turnip, the primrose, the orchis, the coffee-tree, the woodruff, the fuchsia, the geranium, the St. John's wort. To the same great section of nature belong ferns of all kinds, mosses, seaweeds, all trees which bear their flowers in those beautiful pendulous clusters called catkins, sedges of all kinds, the immense company represented in mint, sage, thyme, lavender, and other aromatic plants, and many, many more, with all of which genuine botany makes us acquainted during the first year of our attention to it. All, moreover, possess their own simple distinguishing structural characteristics, very specially in the flowers, but with great help in the leaves and other parts. How pleasant, once seeing those marks, to be able to tell an orchid, for instance, at a glance, by its singular lip, and stamens, and pistil welded together; or a mint-family plant, again by its lip, but stamens invariably either four or two, and perfectly separate and independent. The poisonous families are told quite as easily. So are those which contain admixtures of good and bad. So are those which stand in the position of neutrals. To look up these distinguishing marks, and to verify what they tell, supplies endless pastime during one's rambles in the country. The plant is learned first for what it is—a primrose, a violet, or whatever it may be; then for what its character is; just as in intercourse with our fellow-men we ask first, who are you? then, what are you good for?

By the munificent wisdom of the Creator of all these plants, the very poisonous ones have, every one of them, their own particular brand. No poisonous plant exists in Britain that may not be told at once by some significant mark. The same kind of mark is never found in two different poisonous plants, so that once learning what it is, we detect the evil thing on the instant, and without a doubt. Aconite has two little honey-cups shaped like birds. Deadly nightshade has a large leaf and a little one side by side, and a flower shaped like a thimble. Hemlock has a stem smooth as glass, and spotted with red. Celandine, when broken at the joints, exudes an orange-coloured juice. Colchicum is just like a purple crocus, but has six stamens instead of three, and the anthers open down the outer side instead of the inner. Fools' parsley has three pendulous green bracteas, hanging like tails, from every umbellule. Bitter-sweet nightshade has ten green dots in the heart of the flower, looking like a circlet of emeralds round the cone of yellow stamens. The arum has a curious purple or buff-coloured pillar above the actual flowers, the whole wrapped round by a curving leaf. The yew-tree—but we must stop. Enough has been said to indicate that botany is a perennial recreation in the simple fact of its providing opportunities for acquiring knowledge of so curious and really valuable a description. Lives are lost every year through the unhappily ignorant gathering and eating of deleterious plants, leaves, and fruits. To be able to put the careless and unwary upon their guard, is to fulfil one of the most excellent uses of botany. The kind of knowledge indicated is not to be supposed available, moreover, only in one's own country. What is true of botany in England, is true of it all the world over.

Organic and Inorganic Matter.

Permit me to make a few remarks upon the paper by Professor Lionel Beale, in your August issue.

Professor Beale is well known as a strenuous upholder of the theistical doctrine of living matter, and as the untiring opponent of the advocate of abogenesis. He has been successful in exposing not a few of the fallacies of the repelling materialistic theories advanced by some modern philosophers, and with his conclusions all right—thinking men will heartily spmpathise. But, perhaps from his researches being mainly confined to the living body, there is in his essays and papers a tendency to unduly exalt the mysteries of living matter, and to depreciate those of non-living inorganic matter. In the extract under consideration this disparagement is obvious, and can be read in every sentence.

Now the laws which govern the physical world are little less mysterious than those which govern the living. Of some of these laws we know very little, or nothing at all, and like many phenomena of vital action we can only give them mere empty names. Take the science of mineralogy for instance. The laws of crystallisation; what are they? Why should one mineral crystallise without fail in a given manner, and another crystallise in a wholly different fashion? What is the reason why different kinds of igneous rocks crystallise in different ways, and what are the laws that each obey? In the domain of chemistry, likewise the action of certain substances upon each other is wonderfully curious, and the reason *why* they so act upon one another is incomprehensible.

There are strange and marvellous things enacted in other states of matter, besides that of the living body, and phenomena not less mysterious, but the whole relations existing between the physical and vital conditions are not yet known to man, and perhaps will for ever be beyond his ken.

How then can we say with Professor Beale that "it has been conclusively shown that the laws of vital force or power are essentially different from those by which ordinary matter and its forces are governed?" The statement implies a knowledge of the laws of the physical world which man has not yet reached, and when we reflect on how little we know even of the laws which govern ordinary matter, the above conclusion appears too premature.

However, I did not start with the intention of controverting the views of Professor Beale, for in my opinion they cannot be refuted. I wanted to point out that the purely physical world is nowise destitute of mystery, and that its laws in many cases are as wonderful, though perhaps less understood, as those which govern the purely vital world.

But if it *does* happen to be our lot to witness a mastery by man over the physical world, and to obtain as the result of such mastery a complete knowledge of its most hidden mysteries, I believe that the distinction between living and non-living matter will be put on a broader and more distinct basis than it is at present. We may find that the world of inorganic matter is truly a marvellous one, reflecting the glory of its Maker, but it will be a separate world from *our* world, if I may so simply term our own conscious existence, and we will *not* see the evolution of a single living form from previously non-living matter.

W. P. Livingstone.

Our Study Table.

Notes and Jottings from Animal Life, by the late *Frank Buckland, M.A.* (London: Smith, Elder, & Co.)—The friends of the late Frank Buckland have done well to collect these papers together, for although they are of varying degrees of excellence, there are but few of them unworthy of preservation, and most of them are full of that quaint humour which added so much to the interest of Mr. Buckland's observations in natural history. He was not only a naturalist, but a humourist, and was continually observing some of the oddities that abound in nature. It is this quality which gives a certain interest even to his most trifling work. The present volume contains notices of Joe the Chimpanzee, John Hunter's chair, London bird-catchers, tiger fight at the Zoological Gardens, the descent of the lion from Northumberland House, the waxworks in Westminster Abbey, and many other similar topics. The volume is capital reading for an idle hour, and to those who know how to use it rightly will afford not only amusement, but a good deal of solid instruction. What can be more amusing, and in its way suggestive than the following anecdote:—"I was also told a very funny story of the artfulness of common chickens. In former days it was difficult for visitors to get anything to eat at John-o'-Groat's, there being no butchers or bakers within miles. When visitors arrived it was the custom of the proprietor of the little inn to chase and catch a chicken, and pluck and roast him at once for the visitors' dinner. In course of time

the chickens became very artful. They kept a sharp look-out, and when they saw a carriage coming along the road—they could see a long way down the straight road from the inn—they bolted, as the French would have it, *à toutes jambes*—with all legs—into the heather, and did not reappear until the visitors had eaten their bacon without the chicken, and taken their departure. That birds learn from experience is quite certain; when the telegraph wires were first put up between Berrydale and Hemsdale, the grouse were continually flying against the wires and killing themselves, and in one season the driver of the mail-cart picked up no less than forty brace of grouse that had been so killed. Of late years not a grouse has been found killed by the telegraph wires. They seem to have passed on the warning that telegraph wires were dangerous." We may also refer specially to the article on Lord Bates' attempt to re-introduce the beaver, in which is incidentally discussed the mention, real or supposed, of the beaver by Dantè. (See page 288.)

THE OUTER EAR OF BLARINA BREVIOICAUDA. By *Dr. Elliot Coues*, U.S.A. (New York: W. Wood & Co.)—It has sometimes been stated that this animal is destitute of external ear, and it has, therefore, been described as anotus; but, in the present interesting paper, Dr. Coues shows that this is a mistake. Although, at first sight, when the fur is undisturbed, there is no appearance of an ear, yet a closer examination reveals the fallacy of the superficial observation. The real character of the organ is fully described by this careful observer.

EASY LESSONS ON BOTANY, by the author of "PlantLife," Second Edition, with 120 illustrations. (London: T. Fisher Unwin).—This small book gives in a pleasant and concise form many particulars about the root, stem, leaf, flower, and fruit, and also a few pages concerning the microscopical structure of a plant. All the lessons are illustrated by diagrams.

LEICESTER LITERARY AND PHLOSOPHICAL SOCIETY (J. Fleming & Co.)—The report shows that the society is large and active. The meteorological reports are given in full, but the papers and lectures are given in brief abstract.

LEICESTER TOWN MUSEUM REPORT (Tomkin & Shardlow).—The museum is controlled by a joint Committee of the Town Council, and outsiders known for their interest in natural science. There are also honorary curators for various departments. Mr. Montagu Browne, F.Z.S., the curator, gives a series of science gossips on Thursday evenings—an excellent plan—and there have also been various lectures.

METEOROLOGY: RAINFALL. By *John Frederick Bateman, F.R.S.* (E. Stanford). RAINFALL AND CLIMATE IN INDIA. By *Sir Joseph Fayrer, K.C.S.I., M.D., F.R.S.* (E. Stanford). These are two papers which were read before the Victoria Institute, and they will very well repay a careful perusal. Mr. Bateman, unlike most Englishmen, has a good word to say for the climate of his native country, and asserts that notwithstanding all its drawbacks, there is none which admits of so many days of the year in which out-door exercise or enjoyment can be indulged in. The importance of rain he emphasises by reference to the immense engineering works undertaken by preceding governments in India for the purpose of storing water for agricultural purposes, and thence passes to the consideration of the rainfall of our own country in particular. This has become a matter of increased importance, owing to the enormous increase of population, and to the aggregation of large masses of the people in the great towns of the country. The manufactures and the sewerage combined have practically made all the English rivers unfit to be sources of domestic water supply, and hence artificial means have to be taken, in order to bring to the great towns the rain which falls upon the hills and mountains. On this point Mr. Bateman gives many curious and important particulars, as to the quantity of rain falling in various districts, and at different altitudes. One result of Mr. Bateman's paper was to lead Sir Joseph Fayrer to prepare a similar condensation of the facts now known respecting the meteorology and rainfall of India. His paper is illustrated by an excellent map, shewing the rainfall for the year 1880, and he has also some interesting observations respecting the influence of climate in relation to epidemics. One point of interest and importance is that of tree planting, and we cannot do better than quote his brief but pregnant reference to the mischief that has been done by the reckless destruction of forests. The experience of India in this matter has been amply confirmed by the experience of many other countries, but the moral is one that needs frequently to be enforced.

LONDON DIALECTICAL SOCIETY QUARTERLY JOURNAL. (The Society, Langham Hall.)—The Dialectical Society have decided to publish from time to time some reports of their proceedings, and the present number, the first of the series, contains a full report of Sir Arthur Hobhouse's address on the physical and moral features of India, and abstracts of several other papers that have been brought before the Society.

A GUIDE TO THE EXHIBITION GALLERIES OF THE BRITISH MUSEUM (NATURAL HISTORY), SOUTH KENSINGTON. (Printed by order of the trustees). The present synopsis contains an account of the specimens exhibited in the departments of geology, palæontology, mineralogy, and botany. For the geological portion, Dr. Woodward is responsible; Mr. L. Fletcher describes the minerals, and Mr. Carruthers the botanical section. The Museum itself is one whose creation is likely to have a marked influence upon museum construction in the future. The process of the transference of the natural history collections from Bloomsbury is not yet complete, and consequently many of Professor Owen's plans have not been put into execution. When this has been done, there can be little doubt that the Natural History Museum will be in the very first rank of the scientific museums of Europe.

TRANSITS OF VENUS.*

BY PROFESSOR WILLIAM HARKNESS, OF THE UNITED STATES NAVAL OBSERVATORY, WASHINGTON, D.C.

TRANSITS of Venus usually occur in pairs, the two transits of a pair being separated by only eight years, but between the nearest transits of consecutive pairs more than a century elapses. We are now on the eve of the second transit of a pair, after which none other will occur till the twenty-first century of our era has dawned upon the earth, and the June flowers are blooming in 2004. When the last transit season occurred the intellectual world was awakening from the slumber of ages, and that wondrous scientific activity which has led to our present advanced knowledge was just beginning. What will be the state of science when the next transit season arrives, God only knows. Not even our children's children will live to take part in the astronomy of that day. As for ourselves, we have to do with the present, and it seems a fitting occasion for noticing briefly the scientific history of past transits and the plans for observing the one soon to happen.

When the Ptolemaic theory of the solar system was in vogue astronomers correctly believed Venus and Mercury to be situated between the earth and the sun, but as these planets were supposed to shine by their own light, there was no reason to anticipate that they would be visible during a transit, if, indeed, a transit should occur. Yet singularly enough, so far back as April, 807, Mercury is recorded to have been seen as a dark spot upon the face of the sun. We now know that it is much too small to be visible to the naked eye in that position, and the object observed could have been nothing else than a large sun spot. Upon the establishment of the Copernican theory it was immediately perceived that transits of the inferior planets across the face of the sun must occur, and the recognition of the value of transits of Venus for determining the solar parallax was not long in following. The idea of utilizing such transits for this purpose seems to have been vaguely conceived by James Gregory, or perhaps even by Horrocks, but Halley was first to work it out completely, and to him is usually assigned the honour of the invention. His paper, published in 1716, was mainly instrumental in inducing the governments of Europe to undertake the observations of the transits of Venus in 1761 and 1769, from which our first accurate knowledge of the sun's distance was obtained. When Keplar had finished his Rudolphine tables, they furnished the means of predicting the places of the planets with some approach to accuracy, and in 1627 he announced that Mercury would cross the face of the sun on November 7, 1631, and Venus on December 6 of the same year. The intense interest with which Gassendi prepared to observe these transits can be imagined when it is remembered that hitherto no such phenomena had ever greeted mortal eyes. He was destitute of what would now be regarded as the commonest instruments. The invention of telescopes was only twenty years old, and a reasonably good clock had never been constructed.

His observatory was situated in Paris, and its appliances were of the most primitive kind. By admitting the solar rays into a darkened room through a small round hole, an image of the sun nine or ten inches in diameter was obtained upon a white screen. For the measurement of position angles a carefully divided circle was traced upon this screen, and the whole was so arranged that the circle could be made to coincide accurately with the image of the sun. To determine the times of ingress and egress an assistant was stationed outside with a large quadrant, and he was instructed to observe the altitude of the sun

*Address of the chairman of the Astronomical and Mathematical Section of the American Association, Montreal, August, 1882.

whenever Gassendi stamped upon the floor. Modern astronomical predictions can be trusted within a minute or two, but so great did the uncertainty of Kepler's tables seem to Gassendi that he began to watch for the expected transit of Mercury two whole days before the time set for its occurrence. On the 5th of November it rained, and on the 6th clouds covered the sky almost all day. The morning of the 7th broke, and yet there was no respite from the gloomy pall. Gassendi continued his weary watch with the sickening dread that the transit might already be over. A little before eight o'clock the sun began to struggle through the clouds, but mist prevented any satisfactory observation for nearly another hour. Towards nine the sun became distinctly visible, and, turning to its image on the screen, the astronomer observed a small black spot upon it. It was not half as large as he expected, and he could not believe it was Mercury. He took it for a sun spot, and carefully estimated its position at nine o'clock, so that he might use it as a point of reference for the planet, if, indeed, he should be fortunate enough to witness the transit. A little later he was surprised to see the spot had moved. Although the motion was too rapid for an ordinary sun spot, the small size of the object seemed to forbid the idea that it was Mercury. Besides, the predicted time of the transit had not yet arrived. Gassendi was still uncertain respecting the true nature of the phenomenon, when the sun again burst through the clouds, and it was apparent that the spot was steadily moving from its original position. All doubt vanished, and recognizing that the transit so patiently watched for was actually in progress, he stamped upon the floor as a signal for his assistant to note the sun's altitude. That faithless man, whose name has been forgotten by history, had deserted his post, and Gassendi continued his observations alone. Fortunately the assistant returned soon enough to aid in determining the instant of egress, and thus an important addition was made to our knowledge of the motions of the innermost planet of the solar system. After this success in observing Mercury, Gassendi hoped he might be equally fortunate in observing the transit of Venus on December 6, 1631. He knew that Keplar had assigned a time near sunset for first contact, but the tables were not sufficiently exact to forbid the possibility of the whole transit being visible at Paris. Alas! alas! these hopes were doomed to dissappointment. A severe storm and wind and rain prevailed on December 4 and 5, and although the sun was visible at intervals on the 6th and 7th not a trace of the planet could be seen. We now know that the transit happened in the night, between the 6th and 7th, and was wholly invisible at Paris.

Transits of Venus can occur only in June and December, and as the two transits of a pair always happen in the same month, if we start from a June transit the intervals between consecutive transits will be 8 years, 105½ years, 8 years, 121½ years, 8 years, 105½ years, and so on. This is the order which exists now and will continue for many centuries to come, but it is not always so. The path of Venus across the sun is not the same in the two transits of a pair. For a pair of June transits the path at the second one is sensibly parallel to, and about twenty minutes north of, that at the first; while for a pair of December transits the parallelism still holds, but the path at the second one is about twenty-five minutes south of that at the first. Hence it happens that whenever Venus passes within about four minutes of the sun's centre at a June transit, or within about eight minutes at a December transit, she will pass just outside the sun's disk at the other transit of the pair, and it will fail. Thus the intervals between consecutive transits may be modified in various ways. If the first transit of a June pair fails they will become 129½ years, 105½ years, 8 years, 129½ years, &c. If the second transit of a June pair fails they will become 113½ years, 8 years, 121½ years, 113½ years, &c. If the first

transit of a December pair fails, they will become 8 years, 113½ years, 121½ years, 8 years, &c. If the second transit of a December pair fails, they will become 8 years, 105½ years, 129½ years, 8 years, &c. And finally, if either the first or second transit of a pair fails both in June and December, they will become 113½ years, 129½ years, 113½ years, 129½ years, &c. When Kepler predicted the transit of 1631 he found from his tables that at her inferior conjunction, on December 4, 1639, Venus would pass just south of the sun, and therefore he believed the second transit of the pair would fail. On the other hand the tables of the Belgian astronomer, Lansberg, indicated that the northern part of the sun's disk would be traversed by the planet. In the fall of 1639 this discrepency was investigated by Jeremiah Horrocks, a young curate only twenty years old, living in the obscure village of Hoole, fifteen miles north of Liverpool, and he found, apparently from his own observations, that although Kepler's tables were far more accurate than Lansberg's, the path of the planet would really be a little north of that assigned by Kepler, and a transit over the southern part of the sun would occur. He communicated this discovery to his friend William Crabtree, and these two ardent astronomers were the only ones who had the good fortune to witness this, the first recorded transit of Venus.

Horrocks had great confidence in his corrected ephemeris of Venus, and it forbade him to expect the ingress of the planet upon the sun before three o'clock in the afternoon of Sunday, November 24, old style (December 4, new style); but as other astronomers assigned a date some hours earlier, he took the precaution to begin his observations on the 23rd. The 24th seems to have been partially cloudy, but he watched carefully from sunrise to nine o'clock, from a little before 10 o'clock until noon, and at one o'clock in the afternoon; having been called away in the interval by business of the highest importance—presumably the celebration of divine service. About fifteen minutes past three he was again at liberty, and, as the clouds had dispersed he returned to his telescope and was rejoiced to find Venus upon the sun's disk, second contact having just happened. Only thirty-five minutes remained before sunset, but during these precious moments he made determinations of the positions of Venus which are even yet of the highest value. Crabtree was less fortunate. At his station, near Manchester, there was but a momentary break in the clouds, a quarter of an hour before sunset. This sufficed to give him a glimpse of the transit, and he afterward made a sketch from memory,

The years sped swiftly by, and as the transit of 1761 approached Halley's paper of 1716 was not forgotten, although he himself had long been gathered to his fathers. In deciding to what extent his plans could be followed it was first of all necessary to know how nearly the real conditions would approximate to those he had anticipated. Passing over a paper by Trebuchet calling attention to errors in Halley's data, Delisle was first to point out the exact conditions of the transit, and the circumstances upon which the success of the observations would depend. In August, 1760, less than a year before the event, he published a chart showing that inaccurate tables of Venus had misled Halley, both as to the availability of his method, and in the selection of his stations. The occasion could be more effectively utilized by a change of plan, and Delisle considered it best to observe at suitably selected localities, from many of which only the ingress, or only the egress, would be visible. Ferguson, in England, seems to have arrived independently at similar conclusions.

The two methods proposed respectively by Halley and Delisle have played so important a part in the history of physical astronomy that it will not be amiss to state briefly the distinction between them. The sun causes Venus to cast a shadow which has the form of a gigantic cone, its apex resting upon the planet

and its diameter continually increasing as it recedes into space. All the phenomena of transits are produced by the passage of this shadow cone over the earth, as each point of the cone corresponds to a particular phase of a transit, any given phase will encounter the earth and first become visible at some point where the sun is just setting; and will leave the earth, and therefore be last visible, at some point where the sun is just rising. Between these two points it will traverse nearly half the earth's circumference, and in so doing will consume about twenty minutes. The only phases dealt with by either Halley's or Delisle's methods, are the external and internal contacts, both at ingress and egress. Delisle's method consists in observing the times of contact at stations grouped about the regions where either ingress or egress is soonest or latest visible. The longitudes of the stations must be well determined, and then by combining them with the observed times of contact, the rate at which the shadow cone sweeps over the earth becomes known, and from it the solar parallax results. At many of the stations best suited for Delisle's method only the beginning or only the ending of the transit will be visible, but for the application of Halley's method both the beginning and the ending must be seen. The theory of the latter method is so complicated that it is difficult to explain it briefly and at the same time accurately; but the following considerations will suffice to indicate its nature. The duration of a transit at any point on the earth's surface depends partly upon the length of path, and partly upon the velocity of that point while within the shadow cone. The length of path is affected by the latitude or the point, and the velocity by the earth's diurnal motion, which in some regions accellerates, and in others retards, the progress of the shadow. The result is that throughout one-half the earth's surface the duration of the transit is lengthened, while throughout the other half it is shortened; the maximum lengthening and shortening occurring at the respective poles of the hemispheres in question. Although these poles are not situated at the extremities of the earth's axis, it usually happens that one of them is shrouded in night; but upon the sunlit side ofthe earth, from which alone observations can be made, localities may exist at some of which the duration of the transit will be twenty minutes or more greater than at others. This inequality is the condition upon which Halley's method depends, and when such localities are accessible it may be advantageously applied. Briefly, then, Halley's method consists in observing the duration of a transit at two or more stations so selected as to give durations of widely different lengths; while Delisle's method consists in employing a common standard time to move the instant when the transit begins or ends at two or more stations so chosen as to give very different values for that instant.

The transit of 1761 was visible throughout Europe, and was well observed by astronomers in all parts of that continent. Besides this, England sent expeditions to St. Helena and to the Cape of Good Hope, and English astronomers observed at Madras and Calcutta; French astronomers were sent to Tobloske, Rodriguez and Pondicherry, Russians to the confines of Tartary and China, and Swedes to Lapland. No less than 117 stations were occupied by 176 observers—and of these 137 published their observations. When this mass of data was committed to computation the result was far from satisfactory. Values of the solar parallax were obtained ranging from 8.49 seconds to 10.10 seconds, and in their disappointment the astronomers of the eighteenth century concluded that too much reliance had been placed upon Delisle's method. The transit of 1769 drew on apace, and to avoid a repetition of the fancied mistake of 1761 attention was directed almost exclusively to Halley's method. The conditions of the transit were carefully discussed by Hornsby in England, and by Lalande and Pingre in

France, and it was found that its duration would be greatest in Lapland and Kamschatka, and least in the Pacific Ocean, California, and Mexico. Astronomers were dispatched to all these regions. England sent the famous Captain Cook to Otaheite, France sent Chappe to California, the King of Denmark sent Father Hell to Lapland, and, in addition, numerous observations were made in Europe, North America, China, and the East Indies. The preparations were most elaborate, and the results better than in 1761, but still not satisfactory. The black drop, and other distortions, disturbed the contacts in this transit as they had done in the previous one, and the values of the parallax deduced by the best computors ranged from 8.43 seconds to 8.85 seconds. Thus the matter rested till 1825 and 1827, when Encke published abstracts of his discussion of the transits of 1761 and 1769, from which he deduced a parallex of 8.58 seconds. This discussion was not printed in full until 1835, when it immediately commanded the attention of astronomers, and the result, which Encke had modified to 8.57 seconds, was universally accepted for more than a quarter of a century. As time wore on certain gravitational investigations led to a strong suspicion that the sun's distance had been overestimated by at least three million miles, and the observations of Mars at its opposition in 1862 converted this suspicion into a conviction. The eighteenth century transits were again rediscussed, and a parallax of 8.83 seconds was found from them by Powalky in 1865, and 8.91 seconds by Mr. E. J. Stone in 1868. Newcombe's paper in 1867 also produced a marked imdression.

The transit of 1847 was then approaching, and in the discussion as to how it should be utilized Halley's and Delisle's methods once more played a prominent part. It was recognized that the uncertainty in the observed times of contact of the eighteenth century transits was largely due to the black-drop, and the causes of that phenomenon were carefully considered. Among them, most astronomers believed that irradiation played an important, if not the principal, part; but at the same time there was a general feeling that the telescopes of a century ago were bad, and that the magnificent instruments of the present day would give better results. In view of all the circumstances it was determined that the contacts should be observed with equatorially mounted achromatic telescopes of from four to six inches aperture, or with reflectors of not less than seven inches aperture, and that magnifying powers of from 150 to 200 diameters should be employed. The Germans and Russians adopted heliometers of about three inches aperture for making exact determinations of the positions of Venus during transit, but other nations did not follow their example. Photography, an agency undreamed of in the eighteenth century, was also available, and all saw the desirability of employing it; but there was much difference of opinion as to how this should be done. The European astronomers preferred instruments modelled upon the Kew photoheliograph, whose objective has 3.4 inches aperture and 50 inches focus, giving an image of the sun 0,482 of an inch in diameter, which is enlarged by a secondary magnifier to 3.93 inches. On the other hand, the American astronomers contended that photographs taken with such instruments would be affected by troublesome errors due to the secondary magnifier; that position angles could not be measured from them accurately enough to be of any use, and that it would be exceedingly difficult to determine the exact linear value of a second arc. They advocated the use of horizontal photoheliographs, which are free from all these disadvantages, and the instruments which they adopted had apertures of five inches, and focal distances of 38½ feet, giving images of the sun slightly more than four inches in diameter. Notwithstanding this radical differ-

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ence of opinion respecting the best form of photoheliograph, the astronomers of the old and new worlds were in perfect accord as to how the instruments should be employed. Between the first and second contacts, and again between the third and fourth contacts, photographs about five minutes square, showing the indentation cut by the planet into the sun's limb, were to be taken at intervals of a few seconds, and from these it was hoped the true time of contact could be deduced with great accuracy. Between the second and third contacts pictures of the entire sun were to be taken at short intervals, and the positions of Venus relatively to the sun's centre were to be obtained from them by subsequent measurements. In the latter case the photoheliograph took the place of a heliometer, and was superior to that instrument in its power of rapidly accumulating data.

The question of instrumental outfit having been disposed of, stations were selected and parties despatched to almost every available point. The United States, England, France, Germany, Russia, Holland—in short, nearly all the nations of the civilized world—took part in the operations. The weather was not altogether propitious on the day of the transit, but nevertheless a mass of data was accumulated which will require years for its thorough discussion. When the parties returned home the contact observations were first attacked, but it was soon found that they were little better than those of the eighteenth century. The black drop, and the atmospheres of Venus and the earth, had again produced a series of complicated phenomena, extending over many seconds of time, from among which it was extremely difficult to pick out the true contact. It was uncertain whether or not different observers had really recorded the same phase, and in every case that question had to be decided before the observations could be used. Thus it came about that, within certain rather wide limits, the resulting parallax was unavoidably dependent upon the judgment of the computor, and to that extent was mere guesswork. Attention was next directed to the photographs, and soon it began to be whispered about that those taken by European astronomers were a failure. Even yet I am not aware that the Germans have published anything official on the subject; but the English official report has appeared, and it frankly declares that "after laborious measures and calculations, it was thought best to abstain from publishing the results of the photographic measures as comparable with those deduced from telescopic view." From the way in which these photographs were taken, Sir George Airy saw that they could not yield position angles of any value, and therefore differences of right ascension and declination could not be determined from them; but they did seem capable of giving the distance between the centres of Venus and the sun with considerable accuracy. Upon trial this proved not to be the case. No two persons could measure them alike, because "however well the sun's limb on the photograph appeared to the naked eye to be defined, yet on applying to it a microscope it became indistinct and untraceable, and when the sharp wire of the micrometer was placed on it, it entirely disappeared." In short, the British photographs are useless for the present, but Sir George Airy hopes that in the future some astronomer may be found who will be capable of dealing with them. We turn now to the American photographs. They present a well defined image of the sun, about 4.4 inches in diameter, and are intended to give both the position angle and distance of Venus from the sun's centre. A special engine was at hand for measuring them; but when they were placed under the microscope only an indistinct blur could be seen. Here, again, was the same difficulty which had baffled the English, but fortunately its cause was soon discovered. The magnifying power of the microscope was only 37½ diameters,

which seemed moderate enough; but was it really so? The photographic image of the sun was about 4.4 inches in diameter, and this was magnified 3.31 times by the objective of the microscope, thus giving an image 14.56 inches in diameter. To yield an image of the same size, a telescopic objective would require a focus of about 1,563 inches, and if the eye piece of the microscope, which had an equivalent focus of 0.886 of an inch were applied to it, a power of 1.764 diameters would be produced. This, then, was the utterly preposterous power under which the image of the sun was seen when the photograph was viewed through the microscope, and no useful result could be expected from it. Means were immediately provided for reducing the power of the microscope to 5.41 diameters, and then the photographs seen through it appeared as the sun does when viewed through a telescope magnifying 225 diameters. After this change all difficulties vanished, and the photographs yielded excellent results. The measurements made upon them seem free from both constant and systematic errors, and the probable error of a position of Venus depending upon two sets of readings made upon a single photograph is only 0.553 of a second of arc. To prevent misunderstanding it should be remarked that this statement applies only to pictures taken between second and third contact, and showing the entire sun. The small photographs taken between first and second contact, and again between third and fourth contact, proved of no value.

These investigations consumed much time and before the result from the American photographs was generally known as international convention of astronomers was held in Paris to consider how the transit of 1882 should be observed. The United States was not represented at this conference, and guided only by their own experience, the European astronomers declared that photography was a ailure and should not be tried again. They knew that the contact methods are attended by difficulties which have hitherto proved insurmountable, but under the merciless pressure of necessity, they decided to try them once more. Unfettered by the action of the Paris Conference, the United States Transit of Venus Commission took a very different view of the case. Its members knew that the probable error of a contact observation is 0.15 of a second of arc, that there may always be a doubt as to the phase observed, and that a passing cloud may cause the loss of the transit. They also knew that the photographic method cannot be defeated by passing clouds, is not liable to any uncertainty of interpretation, and seems to be free from systematic errors, and is so accurate that the result from a single negative has a probable error of only 0.55 of a second of arc. If the sun is visible for so much as six minutes between the second and third contacts, by using dry plates, thirty-six negatives can be taken, and they will give as accurate a result as the observation of both internal contacts. These were the reasons which led the American Commission to regard photography as the most hopeful means of observation, and thus it happens that the astronomers of the Old and New Worlds differ radically respecting the best means of utilizing one of the most important astronomical events of the century. The Europeans condemn photography, and trust only to contacts and heliometers; the Americans observe contacts because it costs nothing to do so, but looks to photography for the most valuable results.

In 1716 Halley thought that by the application of his method to the transit of 1761, the solar parallax could certainly be determined within the 500th part of its whole amount. Since then three transits have come and gone, and the contact methods have failed to give half that accuracy. From the photographic method, as developed by the United States Transit of Venus Commission, we hope better things and perhaps fifty years hence its results may be regarded as the most valuable of the

present transit season. In 1874, as in 1761, exaggerated views prevailed respecting the value of transits of Venus, but no competent authority now supposes that the solar parallax can be settled by them alone. The masses of the earth and moon, the moon's parallactic inequality, the lunar equation of the earth, the constants of nutation and aberration, the velocity of light, and the light equation must all be taken into account in determining the solar parallax, and it cannot be regarded as exactly known until the results obtained from trigonometrical, gravitational and photo-techy metrical methods are in perfect harmony. It may be many years before this is attained, but meanwhile practical astronomy is not suffering. Its use of the solar parallax is mainly confined to the reduction of observation made at the surface of the earth to what they would have been if made at the earth's centre; and for that our present knowledge suffices. The real argument for expending so much money upon transits of Venus is that being an important factor in determining the solar parallax, their extreme rarity renders it unpardonable to neglect any opportunity of observing them. Let us do our whole duty in this matter, that posterity may benefit by it, even as we have benefited by the labors of our predecessors.

The Flowers of Mummy Garlands.

In an interesting article which appeared in the *Academy* of September, Miss Amelia B. Edwards describes some curious additions to the Boolak Museum. Several of the royal mummies discovered last year at Dayr-el-baharee were, it will be remembered, found garlanded with flowers, those flowers being for the most part in as perfect preservation as the specimen plants in a "Hortus Siccus." M. Arthur Rhoné, in a recent letter to *Le Temps*, has described the extremely curious way in which these garlands are woven. They consist of the petals and sepals of various flowers, detached from their stems, and enclosed each in a folded leaf of either the Egyptian willow (*Salix salsaf*) or the *Mimusops Kummel Bruce*. The floral ornaments thus devised were then arranged in rows (the points being all set one way) and connected by means of a thread of date-leaf fibre woven in a kind of chain stitch. The whole resembles a coarse "edging" of vegetable lace work. Among the flowers thus preserved are the bright blue blossoms of the *Delphinium orientalis*, or larkspur; the blue lotus, or *Nymphæa cærulea*; the white of *Nymphæa lotus*, with pink-tipped sepals; the blossoms of the *Sesbania Ægyptiaca*; and the orange-hued flower of the *Carthamus tinctorius*, or safflower, so largely employed as a dye by the ancient inhabitants of the Nile valley. The dried fruit, as well as the dried yellow blossom, of the *Acacia Nilotica* is likewise present; and mention is also made of the blossom of a species of water-melon now extinct. The foregoing are all interwoven in the garlands in which the mummy of Amenhotep I. was elaborately swathed. With others of the royal mummies were found fine detached specimens of both kinds of lotus, the blue and the white, with stems, blossoms, and seed-pods complete. Still more interesting is it to learn that upon the mummy of the priest Nebsoohi, maternal grandfather of the King Pinotem II. (XXIst Dynasty), there was found a specimen of the lichen known to botanists as the *Parmelia furfuracea*. This plant is indigenous to the islands of the Greek Archipelago, whence it must have been brought to Egypt at, or before, the period of the Her-Hor Dynasty (B.C. 1100 or B.C. 1200). Under the Arabic name of "Kheba," it is sold by the native druggists in Cairo to this day.

These frail relics of many a vanished spring have been arranged for the Boolak Museum with exquisite skill by that eminent traveller and botanist Dr. Schweinfurth. Classified, mounted, and, so to say, illustrated by modern examples of the same flowers and plants, they fill eleven cases—a collection absolutely unique, and likely ever to remain so. The hues of these old-world flowers are said to be as brilliant as those of their modern prototypes; and, but for the labels which shew them to be three thousand years apart, no ordinary observer could distinguish between those which were buried with the Pharaohs and those which were gathered and dried only a few months ago.

SOUTH AFRICAN THUNDER-STORMS.

IN Mr. J. A. Froude's "Leaves from a South African Journey," printed in the third series of his "Short Studies of Great Subjects," (London: Longmans, 1877, p. 371), there are two passages relating to thunderstorms in that part of the world. Under the date of November 4th, 1874, he writes:—

"On the road to the Vaal River—First experience of camping out. I am alone in my tent with a glaring sun rising the temperature inside to 90 degrees. The mules have strayed, being insufficiently hobbled. I sent Charley, my black driver, in search of them in the early morning. He returned with his face as near white as nature permitted, declaring that the devil had jumped out of the ground at his feet with four young ones. I suppose it was an antbear. Any way the mules are lost. He has gone back to our last halting-place to look for them. My other youth has started with a rifle to shoot buck, which are round us in tens of thousands, and here am I by the side of a pond which is trampled by the antelopes into mud soup, the only stuff in the shape of water which we have to depend on for our coffee, and, alas! for our washing. To add to the pleasure of the situation the season of the thunderstorms has set in. The lightning was playing round us all yesterday afternoon, and we shall now have a storm daily. Whole teams of oxen are often killed. *To a white man, they say, there is no danger while he has a black at his side, the latter being the better conductor. When one is struck another must be immediately substituted.*"

On the portion italicised, it would be interesting to have the opinion of some scientific students. On the 28th, writing at the Diamond Fields, he says:—

"On the evening of the third day leaving Potscheffstrom we came down to the Vaal River, intending to cross in a ferry boat an hour before sunset. The thunder-clouds unfortunately had gathered up that afternoon blacker than I had yet seen them. Between four and five o'clock the storm began, and between the darkness and the blinding effects of the lightning, in the intervals of the flashes we could scarcely see ten yards from us. Even in South Africa I never saw such a display of celestial fireworks. The lightning was rose colour, deepening at times to crimson. Each flash appeared like a cross, a vertical line seeming to strike the earth, a second line crossing it horizontally. The air was a blaze of fire. The rain fell in such a deluge that the plain in a few minutes was like a lake. Of course we could not move. The horses stood shivering up to their fetlocks in water. At one time there was no interval between the flash and the report, so that we were in the very centre of the storm. The sense of utter helplessness preventing me from being nervous; I sat still and looked at it in mere amazement. In two hours it was over."

This is an interesting description. C.

Birds of Lancashire.

Mr. F. S. Mitchell, of Clitheroe, has been for some years working at the subjects of the birds of Lancashire, and now requests assistance in making the list as complete as possible. The value of local lists of birds is so generally recognized, that no apology is needed for attempting to bring together in a collected form, up to the present date, the ornithological knowledge of Mr. Mitchell's native county.

Lancashire ornithologists, though numerous and intelligent, have, unfortunately, seldom published their observations, and the quantity of material ready to hand is much smaller than is possessed by some other counties. Thus, to make the work complete, it is the more necessary to have full information from those acquainted with every district.

He has already examined the following books: — "Ibis," "Zoologist," Montagu's "Dictionary," "A Companion to the Liverpool Museum," 1808-9, W. Bullock. Mac

Gillivray's "British Birds," Yarrell's "British Birds," Donovan's "British Birds," 1794-1819; Bewick's "British Birds," Hewitson's "Eggs of British Birds," Harting's "Handbook of British Birds," Willughby's "Ornithology," 1678, Dr. Leigh's "Natural History of Lancashire, &c," 1700; Pennant's "British Zoology," 1776-77; Camden's "Britannia," 1806; Bolton's "Harmonia Ruralis," 1794; Latham's "General History of Birds," 1821; Graves' "British Ornithology," 1821; "Zoological Journal," 1824-34; "Magazine of Natural History," 1828-40, "Annals of Natural History," 1838.40; "Magazine of Zoology and Botany," 1837-38; "Annals & Magazine of Natural History," 1880-81; "History of Southport, &c," 1830; "The Naturalist," 1836-39, 1851-57, 1864-66, 1875-79; "Yorkshire Naturalists' Recorder," Dresser's "Birds of Europe," Gregson's "Portfolio of Fragments," Corry's "History of Lancashire," Hamilton's "Reminiscences," 1860; "Field," Byerley's "Fauna of Liverpool," Gibson's "Cavalier's Note Book," Proceedings, &c., of Historic Society of Lancashire and Cheshire," Britton's "Beauties of England and Wales," Thos. Baines' "Lancashire and Cheshire Past and Present," "Science Gossip," White's "Natural History of Selborne," Beck's "History and Antiquities of Furness Abbey," Report of Bury Natural History Society, 1871, Blackwall's "Researches in Zoology," Proceedings of the Liverpool Literary and Phil. Society, Proceedings of the Manchester Literary and Phil. Society.

The points to which he specially desires attention are stated as follows: — State boundaries of district referred to. Note whether each species is permanent resident, summer visitor, winter visitor, occasional visitor (summer or winter). Occurrences of accidental visitors, with date, locality, authority, and fullest possible particulars. Which species are found breeding, specifying breeding localities, not necessarily for publication. On the tendency of each species to increase or decrease, with reasons for same. Dates of arrivals and departures of migrants. Whether migration is partial or absolute. Information as to other parts of the county not included in the particular district. Local names and derivations.

THE FOSSIL FOOTPRINTS IN NEVADA.*

BY JOSEPH LE CONTE, M.D., PH.D.

THE "Carson Footprints" are found in a locality which is a remnant of a sandstone elevation, which had been cut into by erosion. An opening about 100 yards square has been quarried into the ledge, which is surrounded on three sides by vertical cliffs from 10 to 32 feet high, on the floor of which the nearly level strata appear well exposed. The strata consist of heavy, bedded, grayish, and creamy sandstone, separated by thin layers of shale. The sandstones in many places, especially in the eastern cliff, are strongly affected with cross laminations, indicating deposit by rapid shifting, over-loaded currents—in other words river flood deposits. We have, therefore, the mouth of an ancient stream. There appear to have been two shale floors, about two feet apart, on which layers tracks are found. The whole area uncovered is literally strewn with these tracks. Parts of the area cleared have been trampled over by men and horses for eight or ten years, without attracting scientific attention. Besides the tracts a considerable number of fossils have been found, which may assist in determining their age. Among these are fragments of tusks and molars of an elephant, and molars and fragments of jaws containing molar teeth of two species of horse. These were but imperfectly petrified. Two species of fresh-water shells have been found, both *Anadonta*, also one *Physa*. Vegetable remains are also abundant, occurring mostly as matted masses of silicified herbaceous plants. The tracks supposed to be human naturally excited the greatest interest, being several hundred in number. No one who studies them can fail to observe their remarkable general resemblance to human tracks, both in their form and in the

*Abstract of a paper read before the California Academy of Sciences, August 28th, 1882.

apparent singleness of each impression. Their size calls for explanation; although well defined as rights and lefts, their straddle is unusually wide. They might perhaps have been made by a human foot inclosed in a rawhide sandal much larger externally than the foot. This would at first make a flat track until soaked through, after which it would leave a round impression, but no toe marks. The bear and *Mylodon* or gigantic ground sloth, could alone make a track at all resembling these in size and form, and as they are not the tracks of either of these, they are those of a biped, more likely man or the anthropoid ape, familiarly known as the missing link in the chain of human evolution. The track is too much curved for any bear. No animal but a biped, so far as is known, could make such tracks; and this was possible for a man with sandals on to do. The final scientifically expressed opinion must be held in reserve, awaiting further testimony.

THE DEVIL'S COACH-HORSE.

BY P. PERCIVAL.

IN the insect world there is to be found more intelligence, perseverance, and courage, than might be expected from the generally insignificant looking individuals that go to make it up. Despite the seeming disparity between man and the insects, it is among the members of this division of animal life that perhaps the nearest approach to ourselves in mental qualities is made by existing organisms. Ants, bees, wasps, spiders, and even beetles, when closely observed furnish the naturalist with remarkable proofs of energy, endurance, and skill; and many are the stories of moral significance to which the doings of these our lesser brethren have given rise. Among the most curious of our British beetles we may consider the "Devil's Coach-horse," and it is worthy of an introduction to those who know it not. The insect bearing the disreputable name of "Devil's Coach-horse," is perhaps better known in this district as the "Cock-tail," a name at once expressive and peculiarly appropriate. It is an insect fairly common in this country, is well known to the entomologist, and by sight to even many a casual observer. It belongs to the order Coleoptera, the tribe Brachelytra, and is honoured with the specific name of *Goërius oleus* by some writers and *Ocypus oleus* by others. It is of "active predaceous habits," and is thought to be nearly allied to the true carnivorous beetles. In colour it is almost black, perhaps as nearly so as any beetle can be. The chief structural characteristics of the "cocktail" are its filiforms antennel, which give to the head a somewhat satanic appearance, and a long flexible abdomen which it quickly raises when alarmed or angry. The wing cases are very short, resembling nothing so much as a small waistcoat, and it is owing to their brevity in this and other beetles, that the tribal name of Brachelytra has been acquired. The wings are long, and the abdomen when elevated assists in tucking their ample folds under the elytra. When the abdomen is raised in a case of attack, from beneath it are protuded two little whitish bladders which excrete a fluid of musky odour, and it is doubtless to this offensive habit that the insect owes the specific name of "oleus," derived from the Latin *oleo*: to emit a smell.

The perfect insect is quite fearless, and will attack savagely any living thing, without regard to size, obstructing its path or hindering its progress.

One entomologist of note describes it as "a rapacious monster," and this is doubtless its true character to many creatures of more pacific habits. Its choice of prey is by no means limited, it is in fact omnivorous, and often attacks members of its own species. I have frequently enjoyed much amusement at the expense of this insect. I have placed two "Cocktails," presumably males injuxtaposition, and then watched them erect their tails, and

with quite a warlike air advance and engage in fierce combat. I have at other times aroused them by stamping on the ground near or by irritating them with straws, when they, have immediately raised their posteriors, and stood in an attitude of resolute defence, quite comical in insects so small. As an instance of the nature of the "Devil's Coach-horse," I may mention that I once saw a combat between one of these insects and an earth-worm three or four times its size. The engagement was a very interesting one, the worm wriggled and curled its body as if trying to crush its small enemy, but the insect evaded its convolutions with skill, and charged the worm again and again, until quite triumphant it proceeded to gorge itself with the bleeding remains of its opponent. The "Devil's Coach-horse" or "Cocktail" may often be seen in the garden, and on pathways pretty well frequented, and when seen will not shun the attention of the observer. How it acquired the strange name of "Devil's Coach-horse," by which it is known in various parts of Britain, it would be interesting to know, the name of "Cocktail," as may be guessed, has been given because of the peculiar habit already mentioned. Possibly shape, colour, habit, and temper, have all had their influence in the acquisition of the more mythical cognomen.

Cheetham.

Triton Cristatus.

Some time ago I observed a Waity Newt (*Triton Cristatus*) floating on the surface of the water in my aquarium, with its abdomen upwards, and to all appearance dead. After having retained this position for two days it resumed its normal attitude and evidenced active vitality. A few days after, I again observed it in this peculiar position, which it retained for about three hours, resuming its original position and lively manner.

Has any reader of the *Field Naturalist* also observed this strange trait in a newt's character; if so has he discovered the cause?

West Cowes. W. Cole, Jun.

THE RAIN CLOUDS OF THE SUMMER.

BY CUTHBERT OXENDALE.

It seems to me that the rain of the present summer period has fallen so peculiarly that it is worth attention. We read in one newspaper that the weather has been deteriorating the hay crop in one district, and another paper, speaking of the same district, says the hay time has been a little tedious perhaps, but the crop has not suffered materially. These appear to be direct contradictions; but I believe, from watching the subject, that they are not, both being in the main fairly accurate. I have in my enquiries met with similar accounts direct from the farmers. Thunder rain is usually found to be local, and very partial; and a great share of the rain of the summer season has been thunder rain. As to the partial nature of the rainfall, I have witnessed many evidences during the late hay making season. One day in the Ribblesdale valley, in Yorkshire, I noticed hay making proceeding without interruption, and a field's breadth away heavy rain was falling, the hay makers evidently calculating with tolerable accuracy the direction and boundaries of the storm. Other rain clouds were floating in the air, and discharging their tears in loud thunder. On another day I was in a pefrect downpour of rain in the city of Chester, and as soon as I got clear by rail, I could see the two sister cities of Lancashire were each under a cloud, and receiving its contents with tropical force. When I reached Manchester the storm had fled, and I noticed from the train how clearly defined was its track. I went to Liverpool, and the storm there had fled too, but it was looking lachrymose, and densely black in the Southport direction; and when I got there it was sunny, but the trees and vegetation, as seen on the way, were sparkling with water drops. On getting back to Liverpool, the driver of an express train between Manchester and Liverpool informed me that the rainfall on the

western side of Chat Moss had been terrific. The eccentricity of these rain storms reminded me of chasing butterflies in boyhood's days. On another day I was in the vicinity of Fleetwood, in beautiful sunny weather, and after reaching Kirkham I found traces of a recent shower, which reached to a little on the Manchester side of Bolton. Another day I was north of the Ribble, in delightful weather, and I found that Manchester had experienced a soaking day. Incidentally I would just refer here to a ride from London to Manchester last winter, but one when the face of the country was curiously varied between the natural aspect and a counterpane of snow intervening. From London to a few miles south of Rugby the face of the country was pure white, then there were some miles without snow, then snow, then bare again, and finally snow, the areas being large in each case. The confines of these snow areas were not nearly so sharply defined as in the case of the thunder rain showers. Since I began to write this I came down from London, and experienced three wet and three fine stages—harvest work progressing where it was fine. Now the point I wish to arrive at is this: Were those thunder clouds as a rule governed by any rule or flight? My opinion is that they very often followed certain tracks, and my experience agrees with that. And I may mention that at a large farm situate between Liverpool and Widnes, where the weather had been particularly noticed, I was told that the expiring summer had been the worst hay making season for a number of years, and our wet seasons have become almost proverbial. A dozen or fourteen miles nearly east of that place I had heard a pretty similar story; indeed, a farmer said he had not experienced so much difficulty in working his land, through drink, for thirty years. A Cheshire farmer at Mobberley told me that the season up to August had been so continuously wet in that immediate locality that no progress could be made with the hay; while he had two sons, who occupied farms only a few miles away—in what direction I forgot to ask—who succeeded very well. A farmer with whom I spent a day in upper Ribblesdale told me of similar experience in that locality. I heard something of the same kind from a farmer a few miles north of the Wyre. I have not yet asked particularly about the lower Ribble district.

All observers of clouds will have noticed at times long dark continuous lines of rain clouds often coming as it were from the sea, and following pretty nearly the course of the rivers inland. On one of the latter days in August, I sailed down the Thames from London Bridge to Gravesend, and a long rain cloud stretched the whole way along the river. Whether there is any affinity between the clouds and rivers, or whether the valleys attract, or what other law governs these things, I do not attempt to solve, but I present with all due respect my own observations for others' use. I think, with careful observation made at different points, with the object of discovering what guides these showers in their airy flight, at least something entertaining and probably useful might be gained.

"Applied Science."

The *North China Herald* mentions a novelty in the way of applied science which is said to exist among thieves in China. They prepare a composition of some medicated ingredient, supposed to be aconite, and lighting it, blow it into the room to be robbed by means of a tube through a hole previously made (not a difficult thing in Chinese houses with paper windows and doors). The inmates are thus anæstheticised, or at least deprived of the power of speech and locomotion, and the thieves enter and do their work, In vain does the proprietor being robbed see the burglars. He cannot move limb or tongue. It is said that water absorbs this poison, and so, for this purpose, it is not uncommon for wealthy people to sleep with a basin of water at their heads. It is called *men hsiang* or *hsiun hsiang*, to suffocate or asphyxiate with incense.

CHARLES DARWIN ON ANIMAL MIMICRY.

THE death of Charles Darwin has awakened so much interest in his personal character, as well as in his scientific attainments, that the following letter which he recently addressed to one of the workers in zoology in this university, is here printed as an excellent illustration of the qualities which were characteristic of the departed naturalist.

The letter was written in reply to a description, sent Mr. Darwin, of a mollusk which closely resembled in colour and form the sea-weed upon which it habitually lives. This sea-weed is the well known *Sargassum*, or Gulf-weed, which is found floating at the surface of the sea, sometimes in immense quantity. It has long, narrow, leaflike fronds of a peculiar form, with serrated margins, and is of an olive or reddish brown color, with darker blotches and spots.

The mollusk, which is somewhat like a common garden slug, is provided with three pairs of appendages which exactly resemhle in form and color the fronds of the *Sargassum*. The body is also colored like the sea-weed, and the whole animal is so similar in appearance to the plant on which it lives as almost to defy detection.

This resemblance is an instance of what is called "protective mimicry," many cases of which have been noted in other groups of animals. The mimicry is "protective" because the organism which "mimics" the other is concealed from view, and thus protected from the attacks of enemies. Thus in the present case the mollusk is not distinguished from the plant by fish or other predatory animals, is therefore passed by, and escapes destruction. Some idea of the perfection of the resemblance may be gained from the fact that the mollusks escaped discovery for several hours during which the *Sargassum* was kept in a large, clear glass jar in the laboratory, and examined several times in the presence of other animals.

The phenomena of mimicry are of interest on account of their clear illustration of the action of natural selection. Obviously there must be a tendency towards the survival of those individuals which are most effectually hidden—that is, those which most nearly resemble the objects with which they are constantly associated—while other individuals will tend to be weeded out. From this tendency has very commonly resulted general resemblances between organisms and their environments, such as the prevailing white color of arctic animals or the tawny colors of desert animals; and now and then have arisen resemblances so special and detailed as to merit the name of mimickry.

DOWN, BECKENHAM, KENT,
Dec. 21, 1881.

Dear Sir,—I thank you much for having taken so much trouble in describing fully your interesting and curious case of mimicry. I am in the habit of looking through many scientific journals, and though my memory is now not nearly so good as it was, I feel pretty sure that no such case as yours has been described amongst the nudibranch molluscs.

You perhaps know the case of a fish allied to Hippocampus (described some years ago by Dr. Günther in Proc. Zoolog. Soc.) which clings by its tail to sea-weeds, and is covered with waving filaments so as itself to look like a piece of the same sea-weed. The parallelism between your and Dr. Günther's case makes both of them the more interesting, considering how far a fish and mollusc stand apart. It would be difficult for anyone to explain such cases by the direct action of the environment.

I am glad that you intend to make further observations on this mollusc, and I hope that you will give a figure, and if possible a coloured figure.

With all good wishes from an old brother naturalist, I remain, dear sir, yours faithfully,

(Signed), CHARLES DARWIN.

To E. B. Wilson.

John Hopkins University Circulars, August, 1882.

THE "BIRDS OF KILLINGWORTH."*

BY WILLIAM E. A. AXON, F.R.S.L.

IN the construction of his ideal Republic Plato excluded the poets as unprofitable members of the community. The admirers of Longfellow may claim that he has proclaimed a truth which statesmen, both of the old and the new world, have recognised. One of the most charming of the "Tales of a Wayside Inn," is that in which the poet celebrates the massacre of the birds of Killingworth. The New England farmers, annoyed at the ravages of the winged visitors, "speaking some unknown language strange and sweet," were determined to put an end to the nuisance, and "doomed with dreadful words to swift destruction the whole race of birds." It was in vain that the schoolmaster poet pleaded for mercy and urged their claims as the "winged wardens" of the ground, keeping it free from worse pests. The farmers disregarded the wise warning, and a "ceaseless fusilade of terror" cleared Killingworth of the feathered tribes. Next summer came the plague of insects, which, finding no foe to check their march, proceeded on their victorious career until the district became "a desert without leaf or shade." The farmers learned wisdom by the usual bitter process of experience, and in the spring they brought a waggon full of singing birds into the town. These quickly filled the silent woods and fields with melody, and were speedily engaged in clearing the land of the insect pests. Is the story true? Even if not literally exact, it can certainly be paralleled by the experience of other communities. The following, however, is an extract from a letter of Longfellow's:—

"The poem is founded on fact. Killingworth is a farming town on the Long Island Sound, in the state of Connecticut. Some years ago, there was an animated debate in the State Legislature, and the birds were doomed, as stated in the poem. Of course, the details of the poem are my own invention, but it has a substantial foundation of fact."

The lesson of the merry birds of Killingworth is one that we need all take to heart. We slay the bright singers that would not only delight us with their songs but help to protect our grain and fruit. A year or two ago there was held in Paris a "Congrès insectologique," which officially estimated the damage by insects to French agriculture at one milliard yearly. This loss it is declared could be sensibly diminished by the protection of insectivorous birds. The congress recommended the formation, in all primary schools, of societies of pupils who will take a formal pledge of abstinence from the schoolboy pastime of "birdnesting." The chase and destruction of noxious insects is put forward as a preferable form of sport. With a view to spreading accurate knowledge on the subject, the congress suggested that the study of entomology should at once be made compulsory in all normal schools. The same recommendation has been made in Russia. The appointment of State Entomologists is greatly to be desired. There is no doubt that Prof. C. V. Riley has saved great sums to American agriculture, by the work he has done as State Entomologist of Missouri.

In some parts of Russia the farmers are greatly troubled by the Couzka. A congress was summoned in February, 1882, by the Governor of Kharkow, to consider the best means of fighting this enemy, known to science as the *Anisoplia Austriaca*. It first made its appearance in the Melitopol district in 1865, and caused great damage. In 1867 it was estimated that in the Hungarian province of the Banate alone, 6,720,000 of the beetles were destroyed by the hundred men employed for the purpose. In later years the insects have been very destructive, ten bushels of the beetles having been collected

*From a lecture at the Spring Soirée of the Manchester Scientific Students' Association, 12th April, 1882.

upon one acre. They can take long flights, passing from one province to another. In 1879 myriads of these beetles were encountered in the sea near Ochsakoff; where they were so numerous and so close together that it was with difficulty a boat could be pulled through the struggling mass. When at last they were washed ashore, they were allowed to remain, and about three-fourths of them recovered strength and flew away to form a new generation in that district. When it was too late energetic measures were devised against them. The insect, which is one of the *Rutelidæ*, is of the size of a ricinus seed, oblong and slightly convex, and of a cinnamon colour. The eggs are laid about two inches deep in the ground, and the larvæ live through the winter underground, finding nourishment in the soil; and remain in the same stage during the following summer and winter, and on the approach of spring rise to the surface, where they accumulate. A committee of the Entomological Society paid some attention to these destructive creatures in 1878, and recommended as means for their extirpation the rotation of crops and the encouragement of insectivorous birds. The birds are often the real friends of the farmer, and like other friends are not always appreciated.

The *New York Sun* recently had the following remarks on the destruction caused by the Anjoumois silk-moth, which has emigrated to the United States:—

This insect has already caused the destruction of thousands of bushels of corn, wheat, and other kinds of grain in this country, and from present appearances it will soon make the keeping of grain over winter a very difficult matter in the United States, because the moths deposit their eggs on the grain in the fall soon after it is harvested, and the worms work on it all through the cold winter, as well as in summer, when stored in bins or granaries. If the Government or the farmers of this country could arrest the progress of this insect by expending 5,000,000 dollers at this time, it would be the best investment ever made by our people,

We have been watching the progress of this pest for the past ten years, and find that it has become pretty well distributed over nearly all the grain-growing regions in both the Northern and Southern States. As early as 1732 this same grain moth was so destructive in some parts of France as to nearly cause a famine among the people, and it would not be at all strange if the same thing should soon occur in this country, as no effort is being made to check the ravages of this and several other imported grain-destroying insects.

The *Chariæ graminis*, in 1880, did much mischief at Tatton, and appeared in 1881 as a veritable plague of caterpillars at Clitheroe. Much commotion was caused in agricultural circles by the arrival of "a large quantity of insects, which occupy the land from Wiswell to Mearley, near Pendle Hill, a distance of about three miles. They travel together in thousands at a good speed, and devastate the land over which they pass to an alarming extent. The inmates of a roadside inn are kept continually at work brushing them out of the house. The road is almost black with the insects." This insect has acquired an unenviable notoriety on the Continent, having, as we learn from Koellar, committed great devastation on meadow land in the Harz district, and in other parts of Germany, Sweden and Norway. The food of the caterpillar is the soft part of grasses. It is dormant in winter, but begins to eat in the spring, and in June, when it has changed its coat finally, its appetite causes much trouble. In 1816 and 1817 some of the hills of the Harz country, which in the evening were fresh and green, were found dry and bare in the morning, and so numerous were the caterpillars in the road that their crushed bodies made it slippery and dirty. It appears to affect dry situations and hilly pastures, and to avoid low and damp meadows. In order to get rid of them it has sometimes been necessary to dig deep furrows round the attacked places, and then turn the pigs in to eat up the destructive insects. Crows are also natural and effective enemies. In the Harz continued rain has sufficed to extirpate them. Linnæus says that it will not touch the *Alopecurus pratense* nor the *Trifolium pratense*. Mr. Wailes has recorded his observations of the injury they had done at the western side of the mountain of Skiddaw. They had ranged over about fifty acres, where the herbage had

a dry and parched appearance. The larvæ on their line of march could be seen from Keswick. Large flocks of rooks appeared on the scene, and doubtless destroyed great numbers, but the moths were exceedingly plentiful in August.

Various members of the Bury Natural History Society have observed it at Manchester, Chat Moss, Bury, Bolton, Middleton, Stalybridge, and Droylsden. The insects were soon greatly diminished by the crows and sea-gulls, and the rains also helped in clearing the land of them. The Clitheroe farmers attributed this immense profusion of insects to the unusual heat of a part of the summer, and to the diminution of birds, and especially the sea-gulls of the district. When insects assume the proportion of a plague, it is often because the balance established by Nature has been disturbed. Even the sparrow, for whom few are willing to say a good word, does a share in helping the farmer. It has been estimated, from observation, that when a pair of sparrows have their young to feed, they destroy weekly 3,300 caterpillars, without counting the other creeping things on which they wage warfare. The Rev. F. O. Morris mentions two pairs of sparrows which in one half-hour fetched the larvæ of the blue-bottle fly 104 times to the nests where they were feeding their young. One of the birds also caught 14 flies on the wing. He calculates that 280,000,000 flies and 2,080,000,000 blue-bottles were prevented from coming into existence by the thirty minutes' voracious exertion of the sparrows.

In Canada as in England the birds have been placed under the shield of the law. The British Wild Birds' Protection Act, which came into force on the first of March, protects until the first of August the birds in a schedule of 84 names; 45 of these names are merely *aliases*, under which 16 distinct species pass in various parts of the country. Only 56 species of birds are actually scheduled. Many are under the impression that these 56 species given under 85 different names are the only wild birds protected. That is a mistake. Between the first of March and the first of August all wild birds of every kind and description are under the protection of the law, except as against owners and occupiers of land, who, having crops to protect, are permitted to kill the most voracious of their feathered foes. But the birds scheduled are protected even from them, and in order that they shall not be able to take advantage of the fact that birds are often known by different names in different localities, the various names have been given.

These facts should enforce the moral of the poet's story, and some verses from it will be a fitting conclusion :—

It was the season, when through all the land
The merle and mavis build, and building sing
Those lovely lyrics, written by His hand,
Who Saxon Cædmon calls the Blithe-heart King ;
When on the boughs the purple bud expand,
The banners of the vanguard of the Spring,
And rivulets, rejoicing, rush and leap,
And wave their flattering signals from the steep.

The robin and the blue-birds, piping loud,
Filled all the blossoming orchards with their glee;
The sparrows chirped as if they still were proud
Their race in Holy Writ should mentioned be ;
And hungry crows assembled in a crowd,
Clamoured their piteous prayer incessantly,
Knowing who hears the raven's cry, and said :
"Give us, O Lord, this day our daily bread."

* * * * * *

Thus came the jocund Spring in Killingworth,
In fabulous days, some hundred years ago ;
And thrifty farmers, as they tilled the earth,
Heard with alarm the cawing of the crow,
That mingled with the universal mirth,
Cassandra-like, prognosticating woe ; [words
They shook their heads, and doomed with dreadful
To swift destruction the whole race of birds.

And a town-meeting was convened straightway
To set a price upon the guilty heads
Of these marauders, who, in lieu of pay,
Levied black-mail upon the garden-beds
And corn-fields, and beheld without dismay
The awful scarecrow, with his fluttering shreds ;
The skeleton that waited at their feast,
Whereby their sinful pleasure was increased.

* * * * * *

At the meeting only the schoolmaster pleaded for the birds :—

"What! would you rather see the incessant stir
Of insects in the windrows of the hay,
And hear the locust and the grasshopper
Their melancholy hurdy-gurdies play?

Is this more pleasant to you than the whirr
Of meadow-lark and its sweet roundelay,
Or twitter of little fieldfares, as you take
Your nooning in the shade of bush and brake?

"You call them thieves and pillagers; but know
They are the winged wardens of your farms,
Who from the corn-fields drive the insidious foe,
And from your harvests keep a hundred harms;
Even the blackest of them all, the crow,
Renders good service as your men-at-arms,
Crushing the beetle in his coat of mail,
And crying havoc on the snug and snail.

"How can I teach your children gentleness,
And mercy to the weak, and reverence
For Life, which, in its weakness or excess,
Is still a gleam of God's omnipotence;
Or Death, which, seeming darkness, is no less
The self-same light, although averted hence,
When by our laws, your actions, and your speech,
You contradict the very things I teach?"

With this he closed; and through the audience went
A murmur, like the rustle of dead leaves:
The farmers laughed and nodded, and some bent
Their yellow heads together like their sheaves;
Men have no faith in fine-spun sentiment
Who put their trust in bullocks and in beeves,
The birds were doomed, and as the record shows,
A bounty offered for the heads of crows.

There was another audience out of reach,
Who had no voice nor vote in making laws,
But in the papers read his little speech,
And crowned his modest temples with applause;
They made him conscious, each one more than each,
He was still victor, vanquished in their cause.
Sweetest of all the applause he won from thee,
O fair Almira at the Academy!

And so the dreadful massacre began;
O'er fields and orchards and o'er woodland crests,
The ceaseless fusilade of terror ran.
Dead fell the birds, with blood-stains on their breasts,
Or wounded crept away from sight of man,
While the young died of famine in their nests;
A slaughter to be told in groans, not words,
The very St. Bartholomew of Birds!

The Summer came, and all the birds were dead:
The days were like hot coals; the very ground
Was burned to ashes; in the orchards fed
Myriads of caterpillars, and around
The cultivated fields and garden beds
Hosts of devouring insects crawled, and found
No foe to check their march, till they had made
The land a desert without leaf or shade.

Devoured by worms, like Herod, was the town.
Because like Herod, it had ruthlessly [down
Slaughtered the Innocents. From the trees spun
The canker-worms upon the passers-by,
Upon each woman's bonnet, shawl, and gown,
Who shook them off with just one little cry;
They were the terror of each favourite walk,
The endless theme of all the village talk.

* * * * * *

But the next Spring a stranger sight was seen,
A sight that never yet by bard was sung,
As great a wonder as it would have been,
If some dumb animal had found a tongue,
A wagon overarched with evergreen,
Upon whose boughs were wicker cages hung,
All full of singing birds, came down the street,
Filling the air with music wild and sweet.

From all the country round these birds were brought,
By order of the town, with anxious quest,
And, loosened from their wicker prisons, sought
In woods and fields the places they loved best!
Singing loud canticles, which many thought
Were satires to the authorities addressed,
While others, listening in green lanes, averred
Such lovely music never had been heard!

Bnt blither still and louder carolled they
Upon the morrow, for they seemed to know
It was the fair Almira's wedding-day,
And everywhere, around, above, below,
When the Preceptor bore his bride away
Their songs burst forth in joyous overflow,
And a new heaven bent over a new earth
Amid the sunny farms of Killingworth.

The "God-bird" of the Island of Grenada.

In a catalogue of the birds of the island of Grenada which Mr. George N. Lawrence contributed to the proceedings of the United States National Museum, there is a bit of folk-lore about the *Thryothorus grenadensis*, Lawr. "It is known as the Wren or Godbird, and is a sprightly bird, found in houses, in the country, in the forests, and in the towns. Its song is a pleasing warble, and this, with its bright ways, make it a welcome visitor. The blacks will eat nearly every bird but this and the *corbeau*; but this, they say, 'make you dead,' for it is God's bird. Mr. Ober found an old nest in the house at Grand Etang, but the young had gone ("it make child, but he go,") I was told. They were hatched in February. A nest under the verandah now has four young, recently hatched. Going down to examine them one day, I found one of them had about four inches of a "God's horse" ("Walking-stick") (Phasmida) protruding from its mouth. The nest is of dried grass, lined with feathers. Had it not been that these little beggars excited feelings of compassion in my breast, I would have added the old ones to my collection, well knowing that they would be valuable acquisitions."

S. A.

FOREST WEALTH OF THE UNITED STATES.*

BY ALBERT S. BICKMORE, SUPERINTENDENT OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

THE great importance of the industries connected with the forests of our country, and the fact that no collection exists where a merchant, an architect, or a mechanic can see our woods fully represented by specimens of such size and perfection as may yet be obtained, so impressed the President of our Board of Trustees, Morris K. Jesup, that he generously offered to provide for the large expenditure which would be required to gather all the specimens needed completely to illustrate the forest wealth of the United States. In planning the work to be accomplished by the Tenth United States Census, General Walker wisely provided for the gathering of original and authentic statistics upon our forest wealth and lumber industries, and Professor Charles S. Sargent, of Harvard College, was employed to direct a large corps of competent experts to explore our wood-lands, and furnish us for the first time with reliable data on this great natural resource and the important industries that depend upon it; and the bulletins that have already appeared indicate how thoroughly this important work has been performed.

Their field-work for the National Government having been completed, the museum availed itself of this unparalleled opportunity to employ the same trained explorers under the direction of Professor Sargent, who has generously given his own time and labour. These men were sent back, each to the special area he had examined, and directed to select the best single tree of each species that yet remained standing, cut it down and have it taken to the nearest railroad station and forwarded to New-York, without regard to expense. This exploration, undertaken after the field-work of the census was finished, has added species to those previously known as occurring within our national boundaries, and enabled the explorers to gather other valuable data which will render their work for the census more complete. The section of the trunk taken off is about six feet long, and the impressive character the collection will present when placed on exhibition, on account of the massive size of many of the species, can best be appreciated by an examination of the series of photographs, with the dimensions of the originals in their margins, which I have the pleasure to place before the members of this Congress.

At the present rate of the destruction of our forests, it will soon be necessary for the student of American forestry to come to New York and examine specimens in order to realize to what size and perfection our native trees once attained. In gathering the specimens, all the data have been carefully recorded that may have any bearing upon the history of that individual tree; for example as to its exposure to the winds and sun and rain, and the character of the soil on which it was standing, which side faced the north and which the south. After the log was cut off it was carefully wrapped in bagging and packed in a strong case of planks so that all the delicate exfoliations of the bark or the lichens upon its surface are found in their natural condition after the specimens have been transported all the way from the forests of Texas or Oregon.

The photographs also show the mode of preparing the logs for public exhibition. The ends are first sawn off at right angles to the axis of the tree. From the upper end a longitudinal cut is made downward through the middle of the log for about one-third of its length, and a transverse cut takes off the semi-cylindrical slab. These large slabs themselves form, so far as we know, the best series of specimens for museum

* Abstract of paper read before the American Association at Montreal.

purposes to illustrate our forest wealth that has yet been gathered. The upper end of the log is now bevelled, so that when placed on exhibition there will be seen for the lower two-thirds of its height the entire trunk as it stood in its native forest, and above this a horizontal cut back to a prependicular one, having an oblique cut at the top. Of the surfaces left by the saw and plane the right half will be polished and the left half carefully smoothed but uncovered with gum. The leaves, the flowers and the fruit of each species are also gathered and preserved in an herbarium, but for the exhibition a skilfully prepared drawing in water-colors will be shown, displaying these parts in their natural sizes, forms, and hues. After sawing off pieces from the top and bottom of each log, a copy has been made showing the width of the bark, sap-wood, and heart, and of each of the rings of yearly growth, and from the exact data thus obtained something more definite will probably be learned of the rate of growth of each species. Besides each specimen will also be exhibited all its commercial products, as for instance by the long-leaved pine, the turpentine, resin and tar obtained from it.

It has been proposed, as a yet further means of educating our citizens and those who visit our museums and walk in the Park, that each species be numbered, and as many of them have been planted in the Park a label by the specimen in the museum will indicate the particular places in the neighbouring grounds where that species of tree may be found growing; and vice-versa, a visitor walking along a path and noticing a special number on a tree which is new to him, will only have to note that number and then seek for it in the collection, where the kind of wood it will yield, the area over which it is found, and all the facts he is seeking can be readily obtained. The living trees in the Park and the prepared specimens in the museum will thus supplement each other, and afford an exhaustive fund of information to any one who has the least interest in obtaining it. A carefully prepared guide containing a summary of all the facts previously known, and those lately gathered by the census, in language as free as possible from scientific terms and technical phrases, will also be ready when the collection is opened to the public.

Of the 420 arborescent forms of vegetation growing spontaneously within the limits of the United States, over 375 have already been received. There will also be exhibited about a dozen species naturalized, or likely soon to be naturalized, such as the eucalyptus, allanthus, and stellingia, which promise to become of economic importance.

The large size of many of the logs and the necessity that they be thoroughly seasoned before they receive their final finishing, will prevent us from displaying the collection before next spring, but when the exhibition is opened it will be entirely free and every visitor will be welcome to all the information that we ourselves possess. Besides the practical knowledge thus furnished gratis to the farmer, the labourer, and the artizan, we trust the collection will prove to be a subject of interesting study to the children of our public schools, whose teachers are now required to instruct them upon the "materials for food and clothing used in our city." This appears to be the first systematic effort yet made in our country to collect and exhibit our native woods in a complete manner; and we hope that by diffusing knowledge which will result from such an exhibition, among our people, we may aid them in appreciating the beauty as well as the utility of our forests, so that the ruling impulse of the next generation will be, not to destroy what trees may remain, but to use every possible means to secure their preservation.

Rest-harrow.

In Lincolnshire the *Ononis arkensis* is known as the Harrow-rest, but in Lancashire it is called Rest-harrow or Wrest-harrow.—W. E. A. A.

TAPEWORM.

BY T. R. ALLINSON, L.R.C.P., ETC.,

MAN is the least subject of all animals to parasites, not on account of his nature, but on account of his habits. If he had to live in a natural way he would be like the other animals, subject to all kinds of parasites which could find an entrance into his body. But he takes every precaution to avoid them, he filters his drinking water, or most often boils it ; then it goes under the name of tea, coffee, cocoa, beer, porter, etc. Or he has it mixed with other things, and then is known as soda water, lemonade, potash water, salutaris water and a host of others which are all pure water flavoured with something to make them more pleasing to the taste. The land he drains and cultivates, and so again destroys the hatching places of many unhealthy animalcules. His excretions are all got rid of so as to avoid strong odours and decaying matter; the very refuse of his dwelling is put in an ashpit some distance from his house, so that he may avoid every possible chance of disease. He keeps his body clean and takes every precaution to avoid the external parasites, if he finds any, then his first care is to destroy them. He also uses insecticides for the killing of them, if he finds them about his person or dwelling. He is particular about the site of his house, he will not build near a swamp, where he may possibly inhale miasma and so be made ill.

But the great preventative is the art of cooking, he cooks everything from his water to his meat; some few things he eats raw, but these are few in number and are always carefully examined before being sent to the table. His corn may contain parasites, but the cooking destroys them; his fruit and vegetables may also have minute animalcules in them, but the fire also destroys these. His flesh food may also contain them, and fire also destroys these, if the meat is thoroughly cooked *all through*. The eggs of the tapeworm may enter the system through eating raw lettuce, or other raw green stuff, but the real mature animal can only find entrance through flesh meat. The eggs when they enter the system give rise to what is known as hydatid of the liver or of the brain. The contents of which hydatid will, if eaten, give rise to the mature tapeworm.

Man by his habit of flesh eating is subject to three well-known kinds of tapeworm. The "*tenia solium*" is the tapeworm of the poorer classes, and is got from eating the flesh of the pig. The "*tenia medio canellata*" is got from the cow and sheep, and hence is more aristocratic, whilst the "*bothrio cephalus latus*" is peculiar to fish eaters in Switzerland, Austria, and Russia. Man has no particular tapeworm of his own, shewing that he has no right to eat animal carcases, but his dietetic habits subject him to the parasites of the carnivora.

In Abyssinia a man does not think he is healthy unless he has two or three tapeworms : they are the result of eating raw flesh. In Iceland one person out of every four is said to have them, this is due to their dietetic habits, and to the number of dogs they keep, which helps to spread them. Tapeworms are only free in the egg stage ; in the next stage they are enclosed in the muscles or other organs of the body; in the last stage they are found in the intestinal tract which allows of their eggs finding their way into the outer world.

The "*tenia solium*," or solitary worm, is natural to carnivorous animals, as the lion and tiger, and is got by man from eating the flesh of the pig. Let us now follow it in all its courses. Say a lion is infested with this worm, he voids some of the mature segments or joints of this worm; the outer envelope bursts and the eggs are set free. They are scattered far and wide amongst the grass and in the water; these eggs are very tenacious of life, they will stand being dried by a hot wind or being soaked in water a long time. A pig now comes along and in rooting amongst the

grass and roots it swallows one or more of these eggs. When the egg arrives in the stomach, its covering or shell is dissolved by the gastric juice and the immature worm is set free; the gastric juice does not kill the live worm, though it will dissolve a dead one. If we examine a ripe egg we find it contains a small round body, very contractile, and having three pairs of stylets. Two at one end, two a little more behind these—one on each side—and two more behind these—one on each side. When the worm is set free it begins to work these stylets; the first pair pierce the tissues, and the next pair work like oars, and so the worm works its way through the stomach walls into the muscles or other parts of the body. It may pierce a blood vessel and be carried to distant parts of the body. It then becomes embedded and waits results; in the meantime it drops its —now useless—stylets and grows a circle of hooklets round the head! four small suckers are seen a little below the hooklets, and a few segments are developed, forming the neck of the worm. If the pig be not killed and eaten, the worm dies after a time, and its capsule becomes calcified, and as such can be found in the muscles of the pig. The flesh with these worms in is said to be measled. But our pig gets fat and is killed and its flesh is turned into pork or bacon. A piece of this pork is imperfectly cooked, eaten, and enters the stomach. The gastric juice dissolves its outer covering and again the worm is set free, but now in its mature form. It's first care is to look after itself, its hooklets come in useful and it fastens itself to the intestinal walls and settles down to a comfortable existence.

To kill these worms in the muscles of the pig a temperature of 212 Faht. is required. Meat when boiled, roasted, or fried has a temperature of 212 Faht. applied outside, but often the inside may not be hotter than 120 Faht., or at most 160 Faht. This we see by the underdone or rare part of a so called cooked joint.

When it has fastened or moored itself down, it sucks nutriment through its suckers, and begins to grow from the neck, fresh segments are being continually pushed out, these increase in size until they are three-quarters of an inch long and a quarter of an inch wide. In six weeks the tapeworm may be as many yards long, then begins the usual round of development, ripe joints, full of eggs, are broken off and sent into the outer world where again the eggs are set free.

A full grown worm varies in length from fifteen to fifty feet, but it rarely passes thirty, as the joints are being continually broken off. It is composed of a head, neck, and body: the head is about the size of a pin's head. Round its upper end is a circle of hooklets, below these four suckers, and below the head is the neck, which is of the same size as the head; the neck is made up of very fine segments which increase in size as they leave the head until they attain to full grown joints. It has no mouth, stomach nor heart; fluid is absorbed through the suckers, and at once enters a series of vessels, running down each side of the worm. This nourishment is of use in the growth of each joint, but its chief use is to supply the reproductive system. Each joint is composed almost entirely of reproductive organs; each joint is also hermaphrodite, that is, contains male and female elements, and so allows for the fertilization of the thousands of eggs which each joint produces. It is very tenacious of life; segment after segment may be broken off, but as long as the head and a few segments of the neck are left, the tapeworm continues to grow. The symptoms are obscure, the only safe diagnosis being the sight of some joints which are like small pieces of tape. A medical man should be consulted for its cure, and in every case if the head is found, we can rest assured that the worm's career is done. If not, it may grow again, and in six weeks be as long as ever.

The "*tenia medio-canellata*" is found in

the muscles or carcases of sheep and oxen. It has a development like that of the *tenia solium*. Its joints are larger than the *tenia solium*, and its head has large sucking discs and no hooklets, In other ways it is like the last mentioned one.

The "*bothrio cephalus latus*" or broad tapeworm, is almost peculiar to certain spots, the banks of the Swiss lakes and the banks of certain rivers. Where it passed its intermediate stage puzzled our helminthologists for a long time. This is the largest of our tapeworms, the segments often measuring an inch wide. It is rarely seen in England, most specimens being imported from abroad. The eggs are blown into the water or find their way into it, where they are eaten by eels and fishes. They in return embed themselves in the muscle of the fish. The fish are caught, imperfectly cooked and eaten, and so the mature worm is got by man. Thus we see that man gets full grown worms from eating meat and fish, while the immature worm may be got from drinking water or eating raw vegetables.

MOSSES.

BY GEORGE WILSON,

POETS write of gorgeous flowers,
Fairy grots and sylvan bowers,
But those little forms that lie
Sheltered from the sunny sky,
Seldom catch the poet's eye.

On the moor, on mountain brow—
By the pool where willows grow—
In the lane, on ruined wall—
Where the dancing waters fall,
Moss and fungus creep o'er all.

In this mass of silver green
Minute forms of life are seen.
Silver Bryum shining bright,
Glowing like the stars of night
When they flood the earth with light.

Screw Tortula lifts his spear,
Fairy soldiers these appear;
Close and deep their serried ranks,
As they guard their native banks
From the pigmies on their flanks.

By the thrilling brooklet's side,
Watered by the dancing tide,
Glittering gemules meekly dwell—
What to them though waters swell
O'er the banks into the dell.

Silky-leaved Dicranums sleep
In their green bed on the steep,
With their heads of reddish brown,
Slender-stemmed and drooping down,
Garlanded with nature's crown.

Pretty even when they're dead—
Ruby crowns for fairy head,
Tipped with amber and with green,
Brightest jewels ever seen
On the brow of fairy queen.

Feather-mosses intertwined,
These their stems together bind
In a carpet neatly spread,
Where the lark may hide her head
In a soft and downy bed.

On each wall grow mossy cups,
Where the wandering beetle sups
In the evening, when the air,
Dropping moisture everywhere,
Fills each tiny cup with care.

All these mimic forms of grace,
Nature's hand alone can trace,
Half their beauty yet might lie
But that art has lent her eye *
Thus to view them ere they die.

*The microscope.

Starch Grains of Pteris Aquilina.

At the last meeting of the Manchester Cryptogamic Society, Captain Cunliffe exhibited a quantity of starch obtained from the rhozome of *Pteris aquilina*, and stated that the starch grains of this fern differed considerably from the starch grains of the male fern (*Filix mas*).

Sphagnum Torreyanum in England.

At the September meeting of the Manchester Cryptogamic Society, specimens were exhibited, sent by Mr. H. Boswell, of Oxford, of a *Sphagnum Torreyanum* (Sull). He had discovered it this summer at Whitchurch, Salop. Mr. Boswell also contributed specimens of *Sphagnum intermedium var pulchirum* from the same locality, and *Tortula princeps* from Blair Athol.

Are Robins guilty of Parricide and Matricide?

I have been asked whether it is true, as is pretty generally believed here, that the young robins annually kill the parent birds during the autumn months. I am well aware of the pugnacious propensities of these favorite and semi-sacred birds; but I cannot credit this calumnious charge. Will some one of your readers state whether this crime is brought against them in other parts of the country, and whether there appears to be any further ground for the belief beyond their frequent duels?

NORTH LINCOLNSHIRE VICAR.

The Clavel.

In answer to a query as to the precise name of a flower called *clavel* in a quotation taken from "Campaigns and Cruises in Venezuela and New Granada," I beg leave to say that it is undoubtedly the carnation (*Dianthus caryophyllus*), which was formerly a great favourite with ladies in this country, though of course I dare not vouchsafe the full truth of the quoted statement that a single flower sold for ten or twelve dollars, and even for a doubloon. The following nursery rhyme may be mentioned in order to show which were then the *queens of the garden*:

Por la calle arriba
vienen tres hermanas,
el *clavel* y la *rosa*
y la *mejorana*.

It was then that a house garden (there being in those times no public gardens in Caràcas) contained little more than a few roses, some pinks (generally believed to thrive best in *broken* pots), some plants of *aroma* (Erodium moschatum), a bush of *rosa de Berberia* (Nerium oleander), *yerba Luisa* (Lippia citriodora), *novios* (Pelargonium), *conejas* (Balsamina), *pluma de la reina* (*i.e.*, queen's feather, Centaurea Americana), *mejorana* (Origanum Majorana), *monigote* (Vinca rosea), *cayena* (Hibiscus rosa-sinensis), *capacho* (canna indica), *constancia* (Coriopsis), *narciso* (Polyanthes), *clavel de muertos* (Tagetes patula), *clavel de cuarenta dias* (or 40 days' pink, Zinnia elegans), and some luxurious jessamine. *Now* things are changed very much, and public and private gardens (the former all created by the actual president, General Guzman Blanco), can fairly vie with European horticulture in many respects, thanks to the efforts of about half a dozen gentlemen who gave the starting impulse, being the most meritorious Mr. R. Jahnke, a German apothecary (Australian Myrtles and Gladiolas); Mr. Ch. Hahn, now residing in Paris, who in his beautiful garden "El Paraiso" cultivated a great variety of roses and gardenias; Mr. J. M. de las Casas, and Mr. Ch. Casanova (foliage plants, etc).

A. ERNST.

The University, Caràcas.

Our Study Table.

MACCLESFIELD SCIENTIFIC STUDENTS' ASSOCIATION.—The address of the president (Mr. Jno. Dale) contains some interesting comments on the frost and snowstorm of Jan., 1881; the gale of October, 1881, the earthquakes of the same year, and other matters of interest, including an account of the phenomena of January of the present year, which were of a specially notable character.

YORKSHIRE PHILOSOPHICAL SOCIETY. ANNUAL REPORT FOR 1881. (York: J. Sotheran).—An exceedingly interesting report, showing the continued vitality of the Society, to which in a certain measure the existence of the British Association is due. Particulars are given of the additions to the museum under the headings of geology, antiquities, ornithology, comparative anatomy, botany, conchology, entomology and mineralogy. There are also meteorological tables, and an appendix containing an abstract of a paper by Mr. T. S. Noble, on the Middlesborough Meteorite, of March 14, 1881.

FOURTH ANNUAL REPORT OF THE ERITH AND BELVEDERE NATURAL HISTORY AND SCIENTIFIC SOCIETY.—In thisreport the Society has confined its printing to the papers of more especial local interest, and has given as an appendix some notes of pre-historic remains of man in the neighbourhood of Erith, by F. C. Spurrell, and Darenthchurch, by the Rev. R. P. Coats, M.A., and "Erith in Ancient Times," by J. Harris. Mr. Spurrell's paper is done with great care, and contains a classified statement of the various pre-historic remains in the district.

REPORT OF THE COMMITTEE FOR THE EXPLORATION OF THE SUBSIDENCES ON BLACKHEATH. (Blackheath: Edgar Neve.)—This is a carefully prepared paper presented to the Lewisham and Blackheath Scientific Association, and published by their authority. The subsidences in question occurred in November, 1880, when large and deep holes opened without any apparent cause in Blackheath. Opinions were divided as to the origin of these subsidences, and the various theories are set forth by the Committee, who do not, however, pronounce in favour of any. Added to the report are some observations by Mr. F. V. Holmes, F.G.S., of the Geological Survey.

A LANCASHIRE GULLERY.

BY CUTHBERT OXENDALE.

I HAVE to thank Mr. Morris for the word gullery, and he in turn owns his indebtedness to the word rookery. *Larus ridibundus*—the black-headed gull—nests like rooks in colonies, but unlike its dusky brethren builds its nest upon the earth. Like the rook also the gulls are great consumers of grubs and other insects by preference, and are voracious feeders. The black-headed gull, although a maritime fowl, does not depend upon the water or the shore for its food in summer, but seems to prefer the ploughed lands. At Scoulton mere, in Norfolk, twenty miles from the sea, it has bred from time beyond memory, and lays eggs in such abundance that a man and a couple of boys have collected as many as 1000 eggs in a day, which they sell in the markets at Norwich and Lynn at fourpence a score for eating, and they are served cold like lapwing's eggs, and are used for culinary purposes, we are told. The birds being insectivorous and somewhat gross feeders—for they may be seen at Blackpool when the state of the tide suits, gloating on the floating matter which the sewage pipes discharge—the eggs are far from being a delicacy. A farmer's wife who lived many years near "Gull Island," referred to further on, told me that the farm servants used to gather the eggs and fry or boil them by the score at a time, and "horse-proud" ploughmen used to collect the eggs to mix raw with their horse's provender.

Amongst the more remarkable nesting places of *larus ridibundus* may be mentioned Twigmere, Yorkshire; and Dr. Plot has left a curious account of one in Staffordshire, and how the gentry used to assemble at the close of the breeding season to see the young birds chased and caught by the peasantry. Another of these gulleries was at Pallinsburn Hall, Northumberland, the ancient seat of the Askews, of which family Dame Askew, the martyr, was a member.

The gullery to which I invite the reader's notice is situate on the great morass, second in size in Lancashire to Chat Moss, and known as Pilling Moss. It is situate not far from Pilling village, at a point some six or eight miles westerly of Garstang and about the same distance northerly of Fleetwood, and perhaps a couple of miles from the coast.

The birds of this gullery are properly protected against molestation, and their eggs are not allowed to be taken. The owners of two adjoining estates partly occupied by the gullery, jointly maintain a keeper to guard the birds. These owners are Lord Winmarleigh and Captain Bird, to whom the best thanks of all lovers of our wild birds are justly due.

Larus ridibundus is very fastidious in its choice of a nesting place. For something like 30 years the gulls from which those I visited are descended, bred near Preesall, upon a rough spongy piece of land, situate probably a mile or so north of the river Wyre, and about the same distance east from the sea coast. This spot was for long known as "Gull Island" on account of the gulls breeding there. Previous to that time they bred near the site of the present town of Fleetwood, and originally they are said to have migrated from Walney Island, near Barrow. About 1876, "Gull Island" was made into arable land, and being thrust out of "house and harbour" the gulls betook themselves to the spot they now occupy, which is a wet spongy place, just where a shallow ditch divides Winmarleigh from Cockerham, and on the verge of some water known as Cockerham tarn. This sheet of water is fast diminishing in size, owing to vegetable growth, and is probably the last remnant of incompleted victory of the bog plant, for an old distich has it of this moss—

> Once a wood, then a sea,
> Now a moss and e'er shall be.

The prophetic part of these lines, however,

have been shattered by the drainer's tool and the plough, and scores of reclaimed acres are to be reckoned amongst the most productive soils of this country.

Larus ridibundus for seven or eight months of the year is a *rara avis* in the neighbourhood of the breeding place. During the hard winter of 1880-1 a few of these birds were seen in the Mersey by the chief curator of the Liverpool Natural History Museum, and regarded by him as rare visitors at that season of the year. They begin to appear between the Wyre and the Cocker about the end of February up to the middle of March, and are anxiously looked for by the farmers, who like to see them early as indicating the approach of spring. But they do not begin to lay until about the 14th or 15th of April. The eggs are 23 or 24 days before the young appear after the female has commenced to sit. The number of eggs is usually three, sometimes only two, occasionally only one, and rarely four. I was shown a nest containing four full sized eggs. The eggs in the same nest vary considerably. In shape they are very similar to the lapwing's, but a little larger and scarcely so pointed. They vary in size, and the difference in colour is remarkable: one egg may be a dark brown and another a light green, very similar to some duck eggs, and they are marked with brown spots. The nests are similar to the lapwing's, but made more comfortable with roots and grass, and they are so clustered together on the ground that it requires the greatest caution to avoid treading upom them. The local name for the bird is "peche" or "petch," and they are much esteemed by the farmers for the vast amount of insects which they destroy: they are voracious feeders. For some miles round the breeding ground, wherever there is a plough at work, from twenty to thirty of these birds, with their dark heads and snow-white plumage, will be found following the fresh turned furrow, close upon the heels of the ploughman, and both man, horse and birds perfectly understand each other and work in the strictest harmony. On my way to the gullery I approached a ploughman, and near him were several men and boys at work, and whenever a grub or worm was disturbed by the point of the fork or spade a bird or two were waiting to pick it up, but they soon discovered I was a stranger and made off until I was gone to a safe distance, when they returned.

On my visit I alighted at the Winmarleigh station on the Garstang and Knot End railway, being acquainted with the locality where the gullery is situate on the wild elevated moss on the most exposed part. It was a beautifully bright morning, the sun was streaming down and causing the heat to dance and flicker on the ground as I threaded my way to the breeding ground by reclaimed patches and through piles of peat drying for fuel. I had barely ascended the breast of the moss and begun to wade knee-deep through the shaggy "ling," when thousands of these startled birds rose into the air, making a low cry, but not so painful as the lapwing's scream. Seen in the full light of the unclouded sun—it was now ten a.m.—the sight was one I can never forget. The number of gulls has been estimated at 10,000 to 12,000. I think there must have heen many times more than that; but it is impossible to form an approximate guess while the white seething cloud is so active. The keeper in charge of the ground, a very civil fellow, assured me the best time to see them in their strength is very early in the morning or late at night, for, as I saw, scores of the male birds and the females which had not begun to sit were scattered for miles over the country, as I have described above, in quest of food, and morning and evening these are at "home." Occasionally the gullery is visited by a herring gull or two, which eat the eggs or the young of the black-headed species, if they get the chance, and when these visits are made a

fearful fight ensues, the *ridibundi* uniting and beating off the enemy. Year by year the number of gulls visibly increases, thanks to the protection which they receive. And the security against intrusion which they enjoy is attracting the gulls from another small colony near Scorton, a few miles further inland.

It is remarkable that when the gulls took possession of this spot it was entirely grown over a foot or eighteen inches deep with heather, but through the droppings of the bird the heather has disappeared before so rich a manure, and a rank grass and rushes have succeeded. Each year they shift their ground a trifle, and they have now cleared the heather from something like five statute acres, and when I mention how closely the nests lie to each other, it will afford some idea of the number of eggs which are undergoing incubation. I have heard from the keeper since the close of the late breeding season that it was in every respect a good one.

The birds usually rear but one brood of young: sometimes when accident or other cause destroys a nest there will be a second laying. The young birds are ready for departure about the end of June or during July, when they take flight as they become able, and are but rarely in very wild seasons seen again so far from the coast, until they return to seek out their old nesting ground in the following year. The *larus canus* is pretty common, and its cry is an indication to the farmers as "the shriek of the wild sea-mew" is to the mariner on rough weather. It is stated that these birds nest somewhere a little further north of the breeding ground of the *larus ridibundus*, but I was unable to gather any information about it.

In conclusion I have to express my obligations to Lord Winmarleigh for permission to visit the gullery under such favourable circumstances, a treat that I can never forget it.

Pitchery-Bidgery.

According to our Viennese contemporary, the *Apotheker Zeitung*, a considerable sensation has been produced in Austrian medical circles by the recent appearance in the drug market of a new narcotic, hailing from Queensland, and at present only known to the trade by its quaint native name of "pitchery-bidgery." It is the flower of a plant belonging to the solanacea order and indigenous to Northern Australia—a sort of stunted shrub, from three to four inches in height when full grown, and bearing blossoms of a waxy texture, white in colour and flecked with pink spots. These flowers are picked in the month of August, dried, packed tightly in canvas bags, and then subjected to a high degree of pressure, which imparts to them the consistence of cake tobacco. By chewing a small plug of this substance relief is speedily obtained from bodily fatigue, hunger and thirst. A larger dose of "pitchery-bidgery" produces absolute insensibility to pain, but does not subject the patient to any of the inconveniences resulting from treatment by ordinary anæsthetics, In common with the narcotics hitherto familiar to the faculty, pitchery-bidgery, administered in minute doses, acts as a stimulant—in larger quantities as a powerful sedative. But it is stated to possess the peculiar property of enabling those who take it habitually to withstand fatigue and undergo great physical exertion upon a low diet. Like the famous hashish of Monte Cristo it is said to be an effective and agreeable substitute for food and drink. Considering the present cost of good butchers' meat and wholesome fermented liquor, it is probable that the general public will await the further developments of "pitchery-bidgery" with eager and hopeful anxiety. — *Daily Telegraph*.

A Heron and Weasel Fight.

A fight between a heron and a weasel has been witnessed between Beatock and Moffat by two gentlemen. The weasel was intent upon destroying the heron, the heron in turn seized the weasel and shook it as a dog does a rat. The fight was watched for half-an-hour when a boy ran up and seized the bird, and the weasel attacked the man who tried to secure it; fortunately a dog came and was too much for the weasel. K.

THE BEGINNINGS OF MICROSCOPIC STUDY IN MANCHESTER.

BY THOMAS BRITTAIN, F.R.M.S., PRESIDENT OF THE MANCHESTER MICROSCOPICAL SOCIETY.

DURING the fourth decade of the present century the study of natural history by means of microscopic investigation existed in Manchester in a limited circle. In the year 1834 the writer became the possessor of his first microscope, at the cost of about thirty shillings, with which he pursued some investigations of a scientific character, but without results of permanent value. The instrument had the prismatic defect of most, if not of all, the microscopes of the day, so far as the higher powers were concerned, but was a source of great pleasures and stimulated the owner to seek out and take advantage of improvements in the instrument as they began to be introduced. About that time the name of Mr. W. C. Williamson (now the popular Professor of the Victoria University) became well known for the excellent work he was doing with the microscope, as did also that of Mr. J. Sidebottom, Dr. Hepworth, and several others, and it was a great pleasure to the writer to have the advantage of their friendship.

It is but justice to Mr. J. B. Dancer, the optician, of Manchester, to put upon record the valuable aid he gave to students of microscopy at this period, by the prompt introduction of improvements in the structure of microscopes and their appendages, as they came to the front. At his place of business in Cross Street, microscopists frequently met, and many pleasant friendships were formed there which have had the advantage of a life-long duration. Mr. Dancer settled in Manchester in 1841, and I believe he was the optician who had the honour of first introducing achromatic microscopes to the scientific students of the district. I remember seeing a long list of the names of gentlemen for whom he had made achromatic microscopes up to 1845, in which year he made for the writer a third instrument. At that time there were between fifty and sixty owners of achromatic instruments in and about Manchester, and amongst that number there was a respectable minority of excellent practical workers. A large number have passed away, but a few still remain who retain their love for the microscope, as they prove by the practical work they still carry on with that instrument.

It was not until the year 1858 that steps were taken to form a Manchester Microscopical Society. During the years of previous study many pleasant social gatherings had been held, but in that year a number of the more active workers resolved to take steps to form an association, which might embrace a large circle of scientific students, and aid in diffusing the love of microscopic study. The names of those gentlemen are put upon record in a proposal made in the autumn of that year for the establishment of such a society.

The following are the names of the gentlemen who originated the movement:—Messrs. W. C. Williamson, Thos. Turner, T. H. Nevell, Joseph Sidebottom, H. A. Hurst, George Mosley, John Slagg, junr., John W. Maclure, W. Romaine Callender, J. B. Dancer, James Dorrington, J. W. Long, M. L. Tait, John Dale, J. G. Dale, James G. Lynde, Edward Coward, John Watson, S. W. Williamson, John Parry, E. W. Binney, W. H. Rideout, Daniel Stone, Thos. Brittain, James Thompson, and Dr. R. Angus Smith.

A meeting of those interested in the subject was held at the Chamber of Commerce, on the 15th December, in the same year, when it was "Resolved that it was desirable to form a society for the promotion of microscopic research, to be called the Manchester Microscopical Society, and that those who signed the proposal should be the first members."

As the whole of them were members of the Manchester Literary and Philosophical Society, the rooms of that society in George Street were made use of for the purposes of

the new association, when it ultimately assumed the designation of a "section of the Literary and Philosophical Society."

Amongst the names of the founders of the association are many who have made their mark in scientific research, pre-eminently the first chairman, now Professor Williamson, of Owens College, who has by his microscopical investigations in geological flora earned for himself a world-wide reputation.

The first ordinary meeting of the section was held on the 21st February, 1859, when Mr. W. C. Williamson, the president, delivered an inaugural address. On the 21st March, Mr. George Mosley read a Paper on the "History, Habits, and Anatomy of *Daphnia Pulex*." This was the beginning of ordinary practical work which has gone on with more or less of industry until the present day.

Amongst the names of the original promoters are some who have become eminent in the world of politics. Mr. W. Romaine Callender and Mr. J. W. Maclure becoming active leaders on the tory side, and Mr. John Slagg, junr., now member of Parliament for Manchester, an equally active leader on the liberal. Notwithstanding this divergence of opinion on public matters, the common work in scientific research laid the foundation of friendship which remain unbroken, and of pleasant recollections of happy evenings never to be forgotten.

Mr. J. B. Dancer, one of the original members, has the honour of being the first to introduce microscopic photographs. This was in April, 1853, the first production being a copy of a tablet, erected to the memory of William Sturgeon, the electrician, at Kirby Lonsdale. This was done on the suggestion of the late Mr. E. W. Binney, and the photographic picture on a microscopic slide being but the size of a pin's head, was a matter of astonishment to all who had the pleasure of seeing it. Since then works of art and copies of newspapers have been reduced to like minuteness. At the siege of Paris all communications with the outside world were carried on by the application of Mr. Dancer's happy invention. Carrier pigeons conveyed microscopic objects from nation to nation upon which the life or death of armies had to depend; as also the happiness or misery of countless social circles.

A few years after the establishment of the microscopic section of the Literary and Philosophical Society, the Manchester Scientific Students' Association came into existence, and has had a prosperous career in diffusing a love of science by means of lectures, excursions, and microscopic study. In this latter case, as in the former, the work was done by a section, which, however, now partook of a social character, and was as of necessity limited to a comparatively small number of members.

Since the date referred to, the love of microscopic study has spread with remarkable rapidity. Mechanics and young men of small means have entered the field in considerable numbers, and some of them have done excellent work. In 1879 a few microscopists, seeing the growing enthusiasm, entertained the idea of establishing a society for microscopical study upon a popular basis, with a small subscription so as to bring it within the reach of youths and others of limited means.

The subject was first mooted by some correspondence in the *Manchester City News*. The writer, with a few others, Mr. Richard Bastow acting as honorary secretary, had a private conference on the subject, when it was resolved to send out circulars and summon a meeting of those who were thought likely to attend and take an interest in the movement.

This meeting was held in an upper room in the Manchester Mechanics' Institution, on an evening in December, 1879, when twenty-seven persons attended. The result was the establishment of a "Manchester Microscopical Society," *pure and simple*, at a low subscription of five shillings per annum. The idea of the meeting as to its popular basis has been a complete success, as is demonstrated by the gradually

increasing number of members. On the 25th February of the present year, the number of members enrolled was 175, with indications of still further large additions.

This is not the time to speak of the work done by this young and prosperous association, but it may not be improper to notice that a considerable number of young members, new to the difficult work of microscopical investigation, have succeeded in producing most excellent results, insomuch as to astonish older microscopists connected with the movement. It is a great pleasure to the latter to witness the success which has crowned the labours of the few years of the society's existence, and also to look forward with hope to the years that have to come.

A Two-horned Rhinoceros.

The Begum of Ramoo, near Chittagong, last June presented to the Zoological Gardens, Alipore, in the name of her son Nawar Ali Khan, a boy of eleven years of age, an adult female rhinoceros belonging to that group of Asiatic rhinoceroses which is distinguished by the presence of two horns on the upper surface of the facial portion of the head, and which is generally distinct from the one-horned rhinoceros of Asia, and from the two-horned species of Africa. This rhinoceros was captured about seven months ago, by the Begum's retainers. This rhinoceros, as already observed, is a two-horned animal, and it has the *tout-ensemble* and general characters of a two-horned rhinoceros of the same sex caught in the same district, and very nearly in the same locality to the south of Chittagong in February, 1869. This latter rhinoceros was taken to London by Mr. W. Jamrach, where it was purchased for the London Zoological Gardens, Regent's Park, but prior to its shipment for London it was for some months in Calcutta, where it was examined by Dr. Anderson and described by him in the proceedings of the Zoological Society, London, for 1872, as *Rhinoceros Sumatrensis*. Dr. Sclater, the Secretary to the Zoological Society of London, after the animal had been a short time in their gardens, had the opportunity to compare this Chittagong animal with a female two-horned rhinoceros captured in Malacca. The result of his comparison led him at that time to believe that two species of this form of rhinoceros existed, and he was of opinion that to the Malaccan animal must be applied the term *R. Sumatrensis*, and that the Chittagong animal was a new species, which he proposed to call *Rhinoceros lasiotis*, "from the peculiar long hairs which border the outer edge of the ear-conch, and which are of themselves sufficient to render the animal easily recognizable from *R. Sumatrensis*." The rhinoceros just arrived from Chittagong, however, presents several modifications of the characters found in the individual named by Dr. Sclater *R. lasiotis*, and which tend to affiliate it to typical *R. Sumatrensis*. One or two of these modifications may be named. The ears have not the remarkable long drooping fringe of hair, but their margins are densely clad with erect black hairs; and bristly hairs of the same colour occur over the whole surface, sparsely on the back and sides, but densely on the belly and on the front of the limbs; it is also a smaller animal and of darker colour than the so called *R. lasiotis*. Like it, however, there is considerable cranial breadth between the ears, and the skin is finely tubercular compared with the more coarsely tubercular skin of the two horned rhinoceros of the Malayan Peninsular. Taking into account these similarities and dissimilarities, between two animals brought from the same district, the present rhinoceros in the gardens would therefore seem to link together the two phases of one species separable perhaps into a southern and northern race; a conclusion which Dr. Sclater also had more recently been disposed to adopt. It would, however, be very satisfactory if the committee could obtain an example of the two-horned rhinoceros of the southern portion of the Malayan Peninsular, and place it side by side with the present example of the northern race, as the comparison would be of much scientific interest. This northern race would appear to extend into Tipperah and also into Assam, as Colonel C. Napier Sturt shot, in March, 1875, a two-horned rhinoceros near the gorge where the Sunkos river issued from the Bhutan range on the right bank of the Brahmaputra River, forty to fifty miles north of Doobree.

NOTES ON THE SMALLER MAMMALIA OBSERVED NEAR GOOSNARGH.

BY R. STANDEN.

THE common shrew (*Sorex araneus*) is a brisk little creature, and well known to every country observer. It mostly inhabits old walls, dry banks of hedgerows, haystacks, and similar places, and in summer frequents the meadows, where I have often found its nest, made of soft grasses, roofed over, and entered at the side; but more usually, I think, the nest is made in a shallow hole in a dry bank. From five to seven young are produced at a litter. The shrew feeds principally on many kinds of noxious insects, beetles, worms, caterpillars, and even wasps, and I have seen it kill and eat the large evening dor beetle and cockchafer, either of which are nearly as large as itself, supposing its fur removed. Farmers are very much against themselves, if they wantonly destroy this harmless and useful little animal. I once found an albino variety of the shrew, with pink eyes and yellowish white fur. Various reasons have been adduced as to the cause of the extraordinary mortality amongst shrews during autumn (about August), but none seem to satisfactorily account for it, I have dissected many, but learnt nothing from it. Two years ago, I counted thirty-seven lying dead by the roadside during a walk of a mile and a half. Cats catch, play with, and kill the shrew, but refuse to eat it, but owls and kestrels eat it readily. During a severe winter, a shrew came into the house, and created considerable perturbation amongst the female members of our household, they thinking it was a mouse. An ordinary box-trap was set, and the intruder soon became a captive, but when it was seen to be but a harmless shrew, the verdict was unanimous for its liberation, so it was turned out into the kitchen again, and took up its abode underneath the oven. All winter through it came out regularly at night, and ran about the hearthstone quite fearlessly, eating, before us, the bits of bread and meat we supplied it with. I caught it frequently in my hand, but it did not seem to relish it much, for if it could it laid hold of my finger and gave me a vicious little snap with its sharp incisors. When spring returned, our little visitor vanished. According to Aristotle, Pliny, and others, the shrew had a very bad reputation amongst the ancients, and was an object of fear and superstition to our ancestors. This is referred to in "White's Natural History of Selborne," and also by Mr. Bell in his "History of British Quadrupeds."

The water shrew (*Sorex fodiens*) is much larger than the common shrew. It is an especial favourite of mine, and I have spent many hours watching its nimble movements in some quiet stream, or secluded pond. A favourite haunt of its is a pond, overshaded with trees, deep down in a hollow near Goosnargh Mill. Here I have seen five or six in constant motion in search of prey, swimming and diving in search of insects. It swims very rapidly, its glossy black fur making it a very striking object as it scampers along the bank, or hurries along the surface of the water. All at once, it will pop suddenly under water, and its dark coat changes, and shines with a silvery sheen, as it makes its way through the aquatic plants. This is caused by the numerous air bubbles clinging to its fur. Suddenly reappearing at the surface, it emerges dry and glossy again, carrying in its long and pointed snout some insect or other. It does not take it long to swallow this, and then off it goes again, slipping under and over the water with equal ease, and climbing over sticks or herbage in its merry course. But, in order to see all this you must needs be wondrous still and patient, for it is very shy, and on the slightest alarm disappears into some secure hole in the bank. It burrows in the banks and there forms its nest, which I have never yet seen, and it but rarely wanders from the

waterside; but I have now and then found it in the meadows in haytime, at a considerable distance from water.

Four species of the mouse tribe are common with us,—the common mouse (*mus musculus*); the wood mouse (*mus sylvaticus*); the short-tailed field mouse (*arvicola agrestis*); and the meadow mouse (*arvicola pratensis*). The nests of the field mice are often a source of great annoyance in the hay meadows, as they get into the knives of the mowing machines and choke them, involving a stoppage to clear them out, and leaving unsightly ridges of grass where they have dragged along. I once found a pair of wood mice in an old missel thrush's nest, at least four yards from the ground in an oak tree. They had carried up grass and leaves and roofed the nest over, and conveyed into it a quantity of hips, haws, and acorns. A number of long-tailed mice took possession of a blackbird's nest in a cypress tree in the garden, and fitted it up as a dwelling. In a walk along the hedgerows, in autumn, you are pretty sure to come across many old nests of birds which are used by the mice as banqueting rooms, where they carry hips and haws to eat, leaving heaps of the hard seeds to show what they have been doing. I believe we often blame the cuckoo for damage done in sucking birds' eggs, where mice are the real delinquents. I have caught mice in *flagrante dilecto* in two cases!

The barn rat (*mus decumanus*) is too well known here. Its fecundity is wonderful, and, if not checked, it would soon overrun the country. Talking with some old ratcatchers, they have all agreed that the males exceed the females in the proportion of at least twenty to one; and I can confirm this from my own personal experience. May not this be a merciful dispensation of Providence, to prevent the vast increase of this pest, if the proportion of the sexes were anything like equal? A short time ago it was my good fortune to witness a migration of rats. I was standing on the bank of a brook which runs between here and Longridge, when the vanguard of what proved to be an army of rats came in sight. They passed steadily along, close to the water's edge, at a good pace; sometimes two and sometimes eight or ten abreast, all seeming earnestly bent on one object. I counted over two hundred of all sizes. I conjectured their destination to be the neighbouring Asylum at Whittingham, where they swarm in great numbers, and take refuge in the innumerable drains and sewers about the place. We often hear of the dexterity of rats in removing eggs to what seem inaccessible situations, and on one occasion I was an eye-witness of their *modus operandi*. Numerous eggs having vanished from the hen-house, one evening I posted myself, gun in hand, to watch for the marauders, who I suspected to be some cunning rats. I had not long to wait before a fine rat appeared, and I raised my gun to kill it, but desisted, thinking I might gain something by watching its movements. Presently it was joined by two others, one a small one, and after cautiously reconnoitring, one of them went into a nest box, where some eggs had been purposely left, and rolling out an egg, trundled it along the floor, to the foot of a piece of timber, reared aslant with its side to the wall, and just reaching to the ledge on the top of the wall where the slates overlapped. A consultation was held—one of the rats ran up the plank, and down again, and all appearing satisfactory, the smaller one lay down on its side, grasped the egg firmly to its stomach with its feet, at the same time seizing the tail of the largest rat with its teeth, and fore-feet. This set off up the plank dragging the egg in its novel carriage after it, whilst the other pushed behind. They speedily reached the top of the wall, and disappeared down a hole in the corner. They were soon out again, and quickly ran up with another load. They again returned, but, just as they were altogether preparing to cart away another load, I put a stop to the depredations of the trio for ever,

by a shot from my gun. On pulling out some stones in the corner, I found over a score of eggs which they had previously carried up and sucked.

The water rat, or water vole (*Arvicola amphibia*), is common along the banks of streams and ponds. It forms its winter hybernaculum in the banks and sometimes in ploughed fields, where I have seen it turned out by the plough. From seven to nine young are produced at a birth, but its breeding nest is but rarely brought to light. It is often met with at a considerable distance from water, and makes burrows in the meadows not unlike mole-hills. It seems to partake little of the rat in anything but form—being a very harmless creature, feeding chiefly on aquatic vegetables—although, if a turnip or a potatoe field be handy it will sometimes eat a few, for a change. I have often watched a colony in a large pond near here. The pond is thickly overgrown with the giant horsetail (*equisetum*), commonly called "toadpipes," and they feed greedily upon this. Cutting down a number of the tall stems to form a sort of raft, they would sit upon it, washing themselves, and performing many curious antics. They appear to relish that part of the "toadpipe" which grows under water the best; diving down and biting off the stem, then reappearing at the surface, they drag the long stem on to the raft: and eat it at their leisure. They can give a very trenchant bite, as I have once or twice experienced when handling them.

I am sorry to say that the numbers of the hedgehog (*Erinaceus Europæus*) are greatly diminished. I used often to meet with them at dusk, hunting along the hedgerows for food, and often in winter have found them in their snug winter quarters, usually in an old rabbit-hole. I once found a female, with seven newly born young, under a haycock, which a lengthened spell of wet weather had kept in the meadow beyond the usual time. (I have known rabbits' nests in similar situations.) The young ones were blind, and their spines quite soft. I took them carefully home, and kept them over six months in a box. They were interesting, but rather dirty pets, and were given away one by one to various town friends. They are useful where cockroaches abound. and will catch and eat great numbers. They will also catch mice. From the great quantity of insects, mice, &c., these animals destroy, they must be very useful to the agriculturist, but farmers and gamekeepers are in many cases their deadly enemies.

The mole, or "moudiwarp" (*Talpa Europæa*), is rarely seen about Goosnargh, but is common enough in many parts round Preston, and in the Fylde. It is a pity that farmers persecute it so, for it has been, I think, indisputably proved that it is of great service in turning up the fertile soil and destroying insects. I once had an albino variety sent to me, with cream-coloured fur.

In spite of the untiring energy shown by gamekeepers in hunting down the weasel (*Mustela vulgaris*) and stoat (*Mustela erminia*), they may yet be met with pretty frequently. Most farmers are becoming awake to their value as destroyers of vermin, especially rats. I have witnessed, more than once, a stoutly contested battle between a weasel and a rat. They mostly inhabit thick hedgerows, old walls, and coppices. I have several times dug out nests of weasel and stoat, with from four to seven young ones in them. Once I found a weasel's nest in a hollow tree, and another one on the top of a high bank amongst some ivy, a very unusual situation. There were five young ones in this nest, apparently three or four days old. As I was examining them, the mother appeared, her hair on end, and eyes blazing like emeralds; and, springing forward, she gave an angry cry and snatched a young one from my fingers, darting with it down a hole. I did not interfere with her, and she soon carried off the remainder one by one, for I did not care to risk a bite from her. I once attempted to lay hold of a young rabbit, from which a stoat was draining

the life-blood, but I got hold of the stoat instead, and, turning in my hand, it bit my finger savagely, its teeth going into the bone, and there it hung, and as I could not induce it to let go by any other means, I laid its head on a stone and crushed it to pieces with my heel. My finger swelled and gathered, and I suffered great pain for a fortnight. Since then I have "let them alone." The stoat is locally called "foumart" and "pow-cat," but the polecat (*Mustila putorius*) I have never seen, although it was tolerably common in my grandfather's days, according to his account. Both stoat and weasel frequently attack young leverets, and I have seen the old hare running round frantically, whilst her young one was being murdered, without being able to render it any assistance. A hare once passed close to me with a weasel on its back. It was going at a great rate, leaping up, and twisting and turning to shake off its cruel rider; who, with teeth deeply fixed in the poor hare's neck, defied all its efforts to get rid of it. I watched them until lost to sight in a neighbouring plantation, but have no doubt the hare succumbed to its adversary. These animals are laughably impudent in their manners, and a keen sense of the ridiculous always comes over me, when, as I have often seen, one suddenly stands up before you in some narrow path, and crossing its fore paws over its nose, looks up at one in the most comically insulting manner imaginable. The stoat is frequently seen here in its white winter dress.

The sprightly squirrel (*Sciurus vulgaris*), so well known in the south, is a rare visitor with us. I have seen it in Middleton and Cross House woods, and in Brabenah wood, on the road to Grimsargh, where there is now a nest on the top of a tall spruce. It is more frequently met with in the woods at Claughton.

I hope these notes will be interesting to the readers of this journal, and induce others to observe more closely the habits of these little animals—so common, most of them, as to be passed by with contempt—but a study of which will well repay a person fond of natural history. I have never, to my knowledge, met with the oared shrew (*Sorex remifer*); the dormouse (*Myoxus avellanarius*); or the harvest mouse (*mus messorius*), in this locality, and shall be glad to see any instances of their occurrence, either near here, or in Lancashire, chronicled in the pages of the *Field Naturalist*.

Courage of a Hare.

Mr. G. Welborn, jun., of Woolsthorpe, communicates the following remarkable incident to *The Grantham Journal*. He says: On Sunday, May 14th, a most extraordinary occurrence was observed about one p.m., in a field near the Cliff Wood, at Woolsthorpe. A terrier dog was seen to approach within about three yards of a hare, and halt, when, to the surprise and astonishment of two witnesses, the hare made a rush at the dog, who instantly turned tail, and was pursued by the hare. After running thirty or forty yards, the dog again stopped; but, on the hare coming up, the dog fled with much celerity. These alternate chases and pauses were repeated five or six times, until, by the proximity of dog and hare to those who were watching their manœuvres, the hare ceased its pursuit of the dog, and took off into the Cliff Wood—doubtless to the very great relief of the dog. The above is a very rare, or, perhaps, altogether unheard-of example of audacity on the part of a hare.—*Live Stock Journal*.

Feline Fishers.

A correspondent to *Land and Water* thus describes what he saw near Killarney: "We had done very well with the oat cake and cold mutton of the country, and were about to start again when Larry, who was our guide for the day, quietly came up and said, "Hah! ha! do you see the pocher?" And sure enough in a bright little stream not 200 yards from us, and in a place only a few inches deep, was a large tabby fishing as neatly with her paws for the moult as any boy on the banks that could not get over the shallows. We watched her catch half-a-dozen. K.

RIPPLE-MARKS.

BY G. K. GILBERT.

RIPPLE-MARKS are observed, first upon dry, shifting sand; second, on sand under water; third, on sandstone strata. The third case is the fossil phase of the second.

1.—*As to their form.*—The ripples on a slab of sandstone are usually equal, parallel, equidistant ridges, curved over the top, and separated by curved troughs; and the question has been raised whether the curvature of the ridges or that of the troughs is the more acute. Since the stratum which overlies a rippled sandstone may preserve on its under surface a mould, or reversed impression of the rippling, there may be doubt in the case of a detached specimen whether it exhibits the true ripple or its mould. From an extended series of observations in Utah, the speaker concludes that the crests of the ridges are more acute than the intervening troughs, and that this rule is so little liable to exception, that it may be used in determining which is the originally upper surface of a detached or highly inclined bed of sandstone. An opposite opinion is held by Jukes (Manual, 1872, p. 163).

2.—*As to their cause.*—The view is advanced that the ripples on dry and on wet sand are due to *vibrations* of air and of water, and are analogous to, if not homologous with, the accumulations of sand along the node lines of vibrating elastic plates. We know from the phenomena of rapids that running water is thrown into vibration by friction on its channel. We know from the whistling of the wind that air is given uniform vibration by friction. Are not such vibrations, arising from the friction of currents, competent, if constant in position, to produce the phenomena of ripple-marks? The following facts appear to accord with this hypothesis: First, the wavelets are, within restricted areas, subequal in all dimensions. Second, in the case at least of those formed under water, the wavelet does not travel, like a sand-dune, but is constant in position so long as the conditions remain unchanged. In one observed instance, the lamintation of strata showed that a set of ripple-marks had held the same position while two feet of sediment were accumulated. Third, there are compound ripplings. In one fossil specimen exhibited to the society, the ripples are double, each main ridge being supplemented by a smaller one running along its base. In another specimen, a system of ridges is crossed at right angles by another of smaller size, a reticulation being the result.

A different explanation is given by Jukes (*loc. cit.*), and by Dana (Manual, 1874, p. 672).

3.—*As to their Geological Interpretation.*—If currents are adequate to their production, they may be found at great depth, and demonstrative neither of shallow water nor of the proximity of shore, as they are often regarded. They are never found in shales, while few sandstone series are without them. That is, they are formed only where the motion of the water is too great to admit of the accumulation of fine sediment.—(*Bulletin of the Philosophical Society of Washington.*)

New Hepatics.

At the last meeting of the Manchester Cryptogamic Society, Mr. W. H. Pearson exhibited specimens of two new hepatics described by Dr. Spruce in his resent memoir on *Cephalozia*, viz., *Cephalozia leucantha* (Spruce), collected by Mr. Sim near Banchory, Scotland, and *C. aeraria* (Pearson) from Tyn-y-groes, N. Wales. Mr. Pearson also exhibited the following *Jung Helleriana*, a species new to Britain, collected by Mr. George Stabler at Mardale, Westmoreland. The rare *Marsupella Stableri* found on Cader Idris, by Mr. G. A. Holt, this being new to Wales. *Harpanthus scutatus* from Tyn-y-Groes, by C. J. Wild. This rare species is only recorded in Wales from Beddgelert. *Anthelia Juratzkana* from Ben Laoigh by Mr. Peter Ewing. This is the second station in Britain for this rare hepatic.

EUROPEAN FERNS.*

WE are glad to see this handsome volume, and are not without hope that it may help to spread a love of ferns, and convert the admiration felt by so many into closer acquaintance and scientific knowledge. Its appearance is greatly in its favour. It is a well-printed quarto, ornamented with thirty coloured plates and a great number of woodcuts, and can therefore compete on their own ground with what are sometimes styled "Drawing-room books." It differs markedly from many of them in point of quality, for it is unnecessary to say that in the hands of Mr. Britten the work is one that is as scientifically accurate as it is typographically and pictorially pleasing. Mr. Britten explains that his object has been that of "giving a plain and intelligible account of European Ferns." He acknowledges the help received from Dr. Trimen and Mr. W. Carruthers. The introduction deals with ferns in general, and explains the structure, classification, geographical distribution, cultivation, and economic properties of the *filices*; contains further an account of the Fern herbarium, sketches the bibliography of the subject, and is concluded by particulars of the geological distribution of ferns. The species are then described in detail. Under Dicksonia there is a long and interesting excursus on the Scythian lamb (*D. Barometz*)—the creature that was supposed by our somewhat credulous ancestors to grow like a plant until maturity, and then to drop on the ground and run about a veritable animal. Cuts are given to show the reality of the supposed resemblance. The wooden looking lamb is thus contrasted with the actual rhizome, with fronds springing from it. In the article on the *Trichomanes radicans*, the fact is pointed out, that in the district from which it is named, the Killarney fern is almost if not quite extinct, the plant offered to the unwary tourist being as a rule the *Hymenophyllum Wilsoni*. The legends and folk-lore of the bracken form a curious chapter in the mythology of plants. Mr. Britten comments on the limited character of our British fern nomenclature (p. 74), and it is certainly surprising that plants so striking in their appearance, and so widely spread, should not have received greater attention from those local spirits who have invented such a superfluity of names for *arum maculatum*. "The absence," he says, "of blossoms, and the uniform green hue of the fronds, may be considered to explain the paucity of popular fern-names: it must be admitted, however, that the ferns are more than compensated by the number and variety of titles which have been showered upon them by scientific men." The spleenwort owes its name to its supposed medicinal value, and a similar origin may be safely assigned to a large number of botanical names. Mr. Britten, it will be seen, whilst not neglecting scientific information as to form, habits, distribution and economic uses, likes also to gossip by the way on the poetical and superstitious associations of the ferns he is describing. He thus adds a fund of quaint amusement to the solid qualities of his book.

* European Ferns, by James Britten, F.L.S., with coloured illustrations from Nature by D. Blair, F.L.S. (Cassell, Petter, Galpin & Co.)

The Death of Socrates.

The *Philadelphia Ledger* says that the old controversy as to the "hemlock" with which Socrates was poisoned has been revived in France by the experiments of MM. Rochefontaine and Tyriakan. Taking the poisonous hemlock (*conium maculatum*), which is commonly accepted as the fatal plant, they have obtained the active element, circutine, after a great deal of trouble, four grammes only being obtained from the treatment of fifty kilos of fresh leaves. Fifty centigrammes of circutine were introduced into the stomach of a little dog weighing fifteen pounds, with no more serious effect than to stupefy the animal, and death only ensued after sixty-five centigrammes of pure circutine had been administered by subcutaneous injection, the time

occupied being twelve hours. Experiments were also made by M. Tauret with the garden hemlock (*æthusa cynapium*), which has always enjoyed a bad reputation as the alleged agent of rural Borgias, and as a plant apt to be gathered for salad or mistaken for parsley. He tried the juice of the plant upon rats and rabbits without injuring them, and then, in the spirit of a true scientist, administered to himself a dose larger than would be found in the salad of a Nebuchadnezzar, but equally without inconvenience. I have vainly tried to find the papers above mentioned. Can any of your readers supply me with a reference to the journal in which they appeared ?

INQUIRER.

Dr. Siemens' Theory of Solar Energy.

Dr. Siemens recapitulates the fundamental conditions of his theory as follows: (1) That aqueous vapor and carbon compounds are present in stellar or interplanetary space. (2) That the gaseous compounds are capable of being dissociated by radient solar energy while in a state of extreme attenuation. (3) That these dissociated vapors are capable of being compressed into the solar photosphere by a process of interchange with an equal amount of reassociated vapors, this interchange being effected by the centrifugal action of the sun itself. If these conditions could be substantiated, we should gain the satisfaction that our solar system would no longer impress us with the idea of prodigious waste through dissipation of energy into space, but rather with that of well-ordered, self-sustaining action capable of perpetuating solar radiation to the remotest future.—*New York Nation.*

Dr Siemens' Theory of the Sun.

You asked in an early number if Dr. Siemen had discovered perpetual motion, and if we have not got it on the earth, supposing it to have been discovered in the heavens. If, as Plato supposed, the true ideas of things on earth were treasured up as models in heaven, we ought to have something answering on earth to that which exists above, although Plato does not say what heaven he means, but we have no real perpetual motion here. We have continual motion. The plants wither and die, then live again, but the life does not come as a completion of the circle without the aid of an external agent. The sun sends its rays, light, heat, electricity, magnetism, and vitalization whatever that may be, whether a single or a double power, on one compounded of still more than two. The earth then has not this everlasting motion in itself; it is dependent.

Is the sun dependent, or has it the everlasting motion in itself, and will it live for ever ? What right have we to think so ? Is it not a body like many others in heaven, all of whom are connected together, each sends his light to the most inconceivable distance. We know this because we see it. Is not light a form of power ? The sun sends his light-power to distances traversed only in centuries or millenniums. There seems no method by which it returns, and even if some of it did come back as oxygen and hydrogen to burn and make power, there is still that amount which has escaped as light to account for. How does that return ?

To make any part of the universe independent of the rest is to break up creation into fragments, to destroy the union, and to introduce confusion where there is wondrous order. To seek independence in a sun leads us to look next for independence in a pebble, and to fancy it wandering over all creation at its own will, if any force in it remains to which we may for a moment apply that word. In all things we know there are changes; tendencies to something, shewing clearly an end, as this also points to a beginning. Creation has nothing fixed in it that we know of, and we may say with Bailey (in Festus)

> Years on years
> And all appears
> Save God to die.

This is the first argument—we could speak of another, but may leave that for the next correspondent. S.

Cat's Eye Jewel.

Among the jewels of the Shumsool Oomrah family there is a magnificent and rare specimen of a cat's eye said to be in the family for four generations. It is estimated to be worth a lakh of rupees, and is, perhaps, the best specimen of its kind in the world. This very valuable stone has just passed into the

possession of Nawab Ekbalood Dowlah, to whom it was bequeathed by his father, the late Shumsool Oomrah Ameer-i-Kabeer, Co-Regent of Hyderabad.—*Bombay Gazette.*

The "Compass Plant."

Readers of Longfellow will recollect the incident in the pathetic story of "Evangeline," where the good priest points a lesson of patience to the despairing girl, from the compass plant:—

Look at this delicate plant that lifts its head from the meadow,
See how its leaves all point to the north, as true as the magnet;
It is the compass flower, and the finger of God has suspended
Here on its fragile stalk to direct the traveller's journey
Over the sea-like, pathless, limitless waste of desert.

The plant thus described is the *Silphium laciniatum*. It is a perennial, a native of North America, and, as Sir John Hill says, is a "wonderfully stately as well as singular plant. . . The leaves are of a faint green, and the flowers of a glorious colour." The first to study it in a scientific fashion was General Benjamin Alvord, and it was from him that in 1847 Longfellow derived his knowledge of the existence and properties of the plant. The poet, however, was apparently not a very accurate listener, and either from misapprehension or carelessness, described the flower as a "delicate plant." Nothing could be more inaccurate, since the *Silphium laciniatum* is strong and even coarse. Sir J. D. Hooker has noticed the inappropriateness of the poet's adjective, but General Alvord, as we learn from the New York *Nation*, has made an ingenious retort. On the appearance of the first edition of "Evangeline" he called the attention of Longfellow to the mistake, and the poet promptly substituted "vigorous" in place of "delicate." Hence General Alvord is led to remark that in England "the first editions are most read." The criticism is a just one; many, if not all, of the English editions of Longfellow's poems, even including some of them published with the poet's sanction, retain the old reading. Admirers of Longfellow who desire to harmonise poetry and science will do well to make a note of General Alvord's interesting revelation.—*Manchester Guardian.*

POPULAR NAMES OF PLANTAGO LANCEOLATA.

BY A MANCHESTER PYTHAGOREAN.

HAT friend and companion of ingenuous, but bellicose childhood, the *plantago lanceolata*, is blest with as many names as a Spanish Grandee. Britten and Holland give the following popular names by which it is known to the peasantry in various parts of England and Scotland.

Bent	Rib Grass
Black Bent	Ripple Grass
Carl-doddie	Hardhead
Chimneysweeps	Headman
Clock	Jackstraws
Cock-fighters	Kemp
Cocks	Kempseed
Cocks and Hens	Knockheads
Cock's-head	Lamb's-Tongue
Curl-doddy	Lancell
Dog's-rib	Leechwort
Cock Grass	

Some of these names are difficult to explain. Why should it have been known in an especial sense as "leechwort" to our Anglo-Saxon forefathers? What is its occult resemblance to the honourable fraternity of chimney sweeps?

Many of these names refer to the warlike exercise which children use with the *plantago lanceolata*. One juvenile holds the stem, and the other strikes it with a second. Hence we have in Cumberland, Durham, and Northumberland the name of "Cockfighters," whilst in Armagh it is called "Cocks." and in a variety of localities "Fighting Cocks." "We used to call the spikes 'Jackstraws,' and many a good game I have had with them," says Miss Plues, "fighting my fifty against my neighbour's fifty." The object is to decapitate the spike of the opponent's flower. If beheaded it is thrown aside, if it successfully resists the stroke it in turn is used as the sword of the executioner. This process is repeated until one whole flower only remains, and its owner is the victor of the fray. "Knockheads" is another name allusive to this employment. "Bullies" and "Fighting Men" are obviously derived from the same

childish game. Of its antiquity a curious instance has come to light.

M. Paul Meyer has recently described in *Romania* an Anglo-Norman poem containing a contemporary history of William Marshal, the great Earl of Pembroke, who won Magna Charta from King John, and was Protector in the first three years of Henry III. It appears to have been composed by some professional troubadour, partly from oral and partly from written information, a few years after the hero's death, and it is expressly said to have been done at the expense of the earl's son William, who succeeded him in the title. "It is," says the *Athenæum*, "certainly a very polished work, and seems to be of no small historical value, even in the passages relating to the hero's early years. For example, we are told, near the beginning, how John the Marshal, father of the future earl, who took the part of the Empress Maud in the war against Stephen, on one occasion gave his little son William to the usurper as a hostage, and recklessly endangered the poor lad's life by refusing to surrender Newbury at the appointed term. King Stephen, as if to make sure, himself conducted the little fellow to the place of execution, but was so charmed, it seems, with his behaviour on the way that he forbore to carry out his intention. We may add, in justice to the "worthy peer," that this is not the only passage in the poem which attributes to Stephen a delight in childish gaiety. Surely a little usurpation may be pardoned to a king who, as we read elsewhere, was capable of playing at *chevaliers* with a little boy. These *chevaliers*, from the description of the game, would almost appear to be the species of plantain so used to this day, and called by children "Jack Straws" or "fighting men," except that they are said to have had broad and pointed leaves:—

Qui ont la foille agüe et lée.

But whatever they were, little William decapitated the *chevalier* in the king's hand to his great satisfaction, and we are very glad that the record of the fact remains for the credit of King Stephen."—(*Athenæum*, No. 2853, p. 16, July 1st, 1882).

The description of the leaf does not agree very well with *plantago lanceolata*, perhaps in this royal duel *Plantago major* (which has also the warlike name of Kemps) was used.

Intelligence of Cats.

The old proverb tells us that "every dog has his day," and the maxim may be so extended as to include the feline race. The cat has to a certain extent been a despised animal, and disparaging opinions have been freely expressed as to its intellectual and moral qualities. In the present year, however, one of our best naturalists and one of the greatest living poets have spoken brave words in defence of poor puss. Dr. St. George Mivart, in an elaborate and weighty monograph, has taken the cat as a type, and made detailed information concerning its structure serve as an introduction to the study of vertebrate animals in general and of mammals in particular. Whilst devoting his attention chiefly to the physiology of his subject, Dr. Mivart has not omitted what may be called the psychology of the feline race. The cat is no mere automaton, but is moved by emotions that have their parallels in humanity. Thus the cat has a decided objection to wetting its glossy fur, and yet when impelled by danger can swim, and has been known to enter a small stream several times in order to rescue its kittens which had fallen into the water. The keenness of its perceptions are accompanied by a power of memory which in certain cases is highly developed. Its actions sometimes show a power of "putting two and two together"—to use a homely but expressive phrase,—which can only be distinguished from reason by a process of verbal refining that is almost puerile. When a cat of its own mere motion learns to knock with a door knocker or to open a latch in order to obtain admission to the house, it is difficult to deny the power of ratiocination which such actions imply. What shall we say of the cat which was in the habit of catching starlings by getting on to a cow's back and waiting till

the cow happened to draw near to the birds, who were of course quite unsuspicious of the deadly enemy carried by the inoffensive beast? Mr. Mivart sums up the intellectual equipment of the cat by crediting it with instinct, sensation, sense, perception, imagination, sensuous association, memory, organic inference, appetites, emotions, emotional language, and organic volition. It is not, as some appear to imagine, necessary to accentuate the distance between man and the other animals in order to maintain the true dignity of humanity. When every allowance has been made for the powers which the brute creation undoubtedly have, the difference implied by man's possession of the power of speech will remain to mark the enormous gulf which separates him from all other living creatures. Mr. Algernon C. Swinburne has been moved by an account which appeared in the *Spectator* in July, 1881, of a singularly affectionate cat, to send to that journal two anecdotes, one of them showing a strange intellectual faculty, and both testifying very creditably to the moral sentiments of the cat. The first incident is that of a cat which, when its master was dangerously wounded, watched for many days and nights at the door of his room and would not be lured or driven away "till at last it was possible for the convalescent to receive his faithful and inconsolable friend, whose ecstacy may—or rather may not—be imagined." The other anecdote is of a cat which was conveyed to London from a country house in Northumberland. "About a week afterwards it arrived at its old home, half-starved, and wholly fallen from its high estate as a cat of quality and distinction, but recognisable by the household left in charge, having smelt or inquired its way back on foot along a course of some three hundred miles, which it had just before traversed in a carriage for the first time." Both these instances of intelligence and homely affection occurred in cats connected with Mr. Swinburne's own family, in which he tells us "cat-worship has been for centuries a hereditary legacy." We fully appreciate the poet's testimony in favour of the cat, and he will, therefore, we hope, pardon us if we interpret the statement just quoted in a Pickwickian sense. We should be sorry to see the confusion of sects now existing "worse confounded" by the addition to them of esoteric followers of Pasht, the goddess of cats, who had temples and worshippers fifteen hundred years before the advent of Christianity.—*Manchester Guardian.*

Note on the Robin.

Once or twice in my life I have been asked the curious question in reference to the robin, to which attention is requested by a "North Lincolnshire Vicar," in the November No. of *The Field Naturalist*. For more than fifty years I have been a careful observer of such birds as frequent the locality in which I live, and especially so of the robin, whose social and familiar disposition makes him many friends, and renders him an easy subject of study. With all his docility, however, he is one of the bravest and most pugnacious of birds, rigidly careful of his privileges and dignity, and like almost all "favourites" extremely prone to jealousy, which gets him into many violent quarrels with other birds, and often those of his own species. But I never knew one killed by its own young: nor have I ever known any person who did. In no trustworthy book on Ornithology that I am acquainted with, is such a trait in its character ever hinted at. For several years together I have known the same birds build their nest in exactly the same place. No bird, except perhaps the house-sparrow, is so affectionate, and takes such pains in rearing and instructing its young. Perhaps its comparative, or may be, absolute ungregariousness has led to the unfounded notion that it kills its own parents. Its fondness for being in the neighbourhood of a cottage, or a farmstead, with a hedged-fenced garden about it, and its heedlessness in building its nest so easily accessible to cats and other vermin, keep down its numbers. I do not know that it is ever made an article of food in England, but it is so in France and Italy. Charles Waterton, the famous naturalist, of Walton Hall, near Wakefield, relates the following:—"At the bird market near the Rotundo in Rome, I have counted more than fifty robins lying dead on one stall. 'Is it possible' I said to the vendor, 'you can kill and eat these pretty songsters?' 'Yes,' said he, 'and if you will take a dozen of them with you home to dinner to-day, you will come back for two dozen to-morrow.'" MORGAN BRIERLEY.

THE STORY OF GELERT.

BY WILLIAM E. A. AXON, F.R.S.L.

THE story of Gelert is the subject of the following comments by Mr. J. E. Harting, in his work on the animals that have become extinct in Britain in the historic period (London: Trübner).

"It is perhaps not generally known that the circumstance narrated in the story of Bedd Gêlert, with which every one is familiar, is said to have occurred in the reign of King John, and, as it is a story of a British wolf, it is scarcely to be passed over here without some brief notice, the more so as it is not at all unlikely that it is founded on fact. The tradition, as related by Bingley in his "Tour round North Wales,"* is to the effect that Llewellyn, who was Prince of Wales, in the reign of King John, resided at the foot of Snowdon, and, amongst a number of other hounds which he possessed, had one of rare excellence, which had been given to him by the king. On one occasion, during the absence of the family, a wolf entered the house: and Llewellyn, who first returned, was met at the door by his favourite dog, who came out, covered with blood, to greet his master. The prince, alarmed, ran into the house, to find his child's cradle overturned, and the ground flowing with blood. In a moment of terror, imagining that the dog had killed the child, he plunged his sword into its body, and laid him dead on the spot. But, on turning up the cradle, he found his boy alive and sleeping by the side of the dead wolf. This circumstance had such an effect on the mind of the prince, that he erected a tomb over the faithful dog's grave on the spot where afterwards the parish church was built, called from this incident Bedd Gêlert, or the grave of Gêlert. From this story was derived the common Welsh proverb, 'I repent as much as the man who slew his greyhound.'"

It is clear from this that Mr. Harting regards the death of Gêlert as an historical incident. But the story is one of those fragments of ancient folk-lore that have passed from land to land and found in many countries a local habitation and a name. It is given in the "Gesta Romanorum," which is thought to date from the second half of the thirteenth century. According to this version Folliculus, a knight, was fond of hunting and tournaments. He had an only son, for whom three nurses were provided. Next to this child he loved his falcon and his greyhound. It happened one day that he was called to a tournament, whither his wife and domestics went also, leaving the child in a cradle, the greyhound lying by him, and the falcon on his perch. A serpent that inhabited a hole near the castle, taking advantage of the profound silence that reigned, crept from his habitation, and advanced towards the cradle to devour the child. The falcon, perceiving the danger, fluttered with his wings till he awoke the dog, who instantly attacked the invader, and after a fierce conflict, in which he was sorely wounded, killed him. He then lay down on the ground to lick and heal his wounds. When the nurses returned, they found the cradle overturned, the child thrown out, and the ground covered with blood as well as the dog, who they immediately concluded had killed the child. Terrified at the idea of meeting the anger of the parents, they determined to escape, but in their flight fell in with their mistress, to whom they were compelled to relate the supposed murder of the child by the greyhound. The knight soon arrived to hear the sad story, and maddened with fury, rushed forward to the spot. The poor wounded and faithful animal made an effort to rise, and welcome his master with his accustomed fondness; but the enraged knight received him on the point of his sword, and he fell lifeless to the ground. On

* "A Tour round North Wales," 1800, vol. i., p. 364. See also Sir John Carr's "Stranger in Ireland," 4to, 1806.

examination of the cradle the infant was found alive and unhurt, and the dead serpent lying by him. The knight now perceived what had happened, lamented bitterly over his faithful dog, and blamed himself for having depended too hastily on the words of his wife. Abandoning the profession of arms he broke his lance into three pieces, and vowed a pilgrimage to the Holy Land, where he spent the rest of his days in peace.

The writer of the "Gesta Romanorum" has borrowed the story from the "Seven Wise Masters." The English version was printed by the late Mr. Thomas Wright from the MS. in the Cambridge University Library, in which the name of the knight is not given. It occurs in Syntipas, which is one of the earliest forms of the "Historia Septem Sapientum Romæ."

There are various other versions. In one the hero is the Czar Piras of Russia. The Mongolian story makes the animal a polecat. The original of the "Seven Sages" is supposed to be the book of "Sendabad," which is thought to have been composed at least two centuries before the birth of Christ. The oriental origin of the tale is further evidenced by the fact that it is one of the fables of Pilpay, and is given in the "Ayar Danush" of Abulfazel. The earliest known form is that given in the "Hitopadesa" and "Pantshatantra." The version in the first-named is as follows:—

"At Oojjayeenee there lived a Brahman whose name was Mahdhava. His wife having been lately brought to bed, left her husband in charge of the infant, whilst she went to perform her ablutions. As soon as she was gone, the Brahman, recollecting that the king's offerings to the manes of his ancestors were about to be made, and seeing other Brahmans going to attend them, was prompted by his natural avarice to reflect in this manner: If I don't go directly, said he, some one else, having heard of it, will go and take away my share of the good things. They say, Time drinketh up the absence of every work which should be done, and is not done quickly, whether it be an act of receiving, or an act of giving away. But, continued he, I have no one to take care of the door, then what am I to do, unless, indeed, I place this, my long beloved weasel there, who is as dear to me as the child itself, and then venture to go. In short, he did so, and went his way to the king's feast. It happened that soon after the Brahman left the house, as the weasel was passing near the child, he saw a black serpent gliding towards it, which he killed, and partly devoured; and when he saw his master returning, the affectionate little animal ran to meet him, with his mouth and legs all covered with blood; and he rolled himself upon the ground at the Brahman's feet in a very extraordinary manner; but the good man seeing him in such a condition, and hastily concluding that he had murdered his child, without further enquiry, put the poor weasel to death. In short, when the Brahman went towards his child, and found it alive and well, and, at the same time, discovered the mangled remains of the black serpent upon the floor near it, the proofs of his weasel's merit and fidelity were so evident, that he suffered the most bitter pangs of sorrow and remorse."

Enough has been said to destroy the idea that there is any historic foundation for the legend in its Welsh form. There are versions of it in Russian, Mongolian, English, French, Italian, German, Latin, Greek, Hebrew, Persian, Arabic and Sanskrit. It is, in fact, one of those tales that are especially dear to the minds of the people. First told, it may be, under the burning sun of Hindostan, it has since become acclimatized in many lands.

Rubezahl in India.

In a description of the Derá Ismáil Khan, Trans-Indus, by Mr. T. W. H. Tolbort, C.S., which appeared in the Journal of the Asiatic Society of Bengal (vol. xl., pt. 1., p. 19. 1871), he says:—Next to the Mián Khels

come the Bábars, a gentlemanly and well-to-do tribe. There is but a small colony of them in British territory, but they are numerous in Khuarsán itself, in the neighbourhood of Quandahár. Their settlement in the Dámán was subsequent to that of the tribes previously named. In our territory, Chaudwán is their chief town. Edwardes borrows a good story from popular tradition to illustrate the acuteness of the Bábars. Once on a time they entered into an agricultural partnership with the devil, and gave him his choice of the roots or stalks, upon which the Bábars sowed nothing but onions, carrots, and turnips. The devil, very naturally annoyed, insisted next harvest on getting the roots, so the Babars grew wheat and sugar. The editor adds:—"This story is also commonly related in Saxony and Silesia. The peasants made the same contract with Kübezahl, the spirit of the Sudetic Range. In fact, he got his name from the contract; for Rübezhal means 'turnip counters.' He came to count his turnips, and found that the peasants had sown rye." The widespread distribution of such legends is exceedingly curious. N.

Swallowing Gold.

Mr. C. T. Gardner in the course of a review in the *Academy* of May 20, 1882, of Historic China, by H. A. Giles, makes the following remarks:—

With regard to the faith in superstitions of educated Chinese it may be mentioned that only eight years ago the Viceroy of the Two Kwang spent £10,000 on the advice of soothsayers in repairing a pagoda in order to recover from dysentery. Again it is not long since Li Hung Chang, the man whom Mr. Giles cites as the leader of progress and the embodiment of the most enlightened ideas, wrote a memorial to the throne stating that several ears of corn had been found growing on one stalk, and proposing that in commemoration of so auspicious an omen, the dynastic title of the Sovereign should be changed. High officers of State have recorded their solemn belief that departed worthies rose from the dead during the Tai p'ing rebellion, and led the Imperial armies to victory; and edicts from the Throne have been issued giving sanction to these superstitions by ordering temples to be erected to the aiding spirits. That great intelligence and high talents do not save the possessor from subjection to superstition can easily be proved; even in our own country it is not necessary to go so far back for example as Matthew Hale's belief in witchcraft.

The error into which Mr. Giles falls in denying the possibility of committing suicide by "swallowing gold" is venial. The expression "swallowing gold" is so often used metaphorically that it is very pardonable to suppose that it can never be taken literally. I have, however, come across a case where suicide was actually committed by choking the throat with gold leaf. In 1867, at Ningpo, a clever scoundrel gave himself out as a new incarnation of Buddha; and, under the cover of simulated sanctity, which deceived his believers, he carried on a lucrative traffic in poisons, and assisted his less credulous patrons in the commission of secret crimes. After his arrest, so many respectable families were found to be implicated, that the local authorities, not daring to investigate the matter themselves, sent him to the provincial capital for trial. On his way thither he managed to procure some gold leaf, rolled up into a very small compass; this he unrolled, and choked himself with it. The body was allowed to be viewed by the public, so that no doubt can exist as to the mode of his death.

INGESTION AMONG FISHES.*

BY T. N. GILL.

APOCHRYPHAL as it may appear, there are some fishes which are capable of ingesting and stowing away entire others several times larger than themselves. This extraordinary feat is rendered possible in the first place by the great size of the mouth, which is cleft far backwards, and in the next by the excessive distensibility of the stomach and abdominal integuments. The captor seizes the larger fish by the tail, and climbs over it, as it were,

* Abstract of a paper read to the Philosophical Society of Washington.

by alternate movements of the upper and lower jaw, until finally the entire animal is stored in the stomach. Meanwhile, the stomach and, of course, the adjoining soft parts, become more and more distended, and hang down like an enormous sack. The most remarkable examples of such capacity have been found in the *Chiaswodon niger*, a species related to the cod family, but several others, especially representatives of the *Lophied* and *Ceratiid* families, are likewise prone to attack others larger than themselves.

Study and Stimulants.

The real influence of the intoxicants and narcotics in common use has been a matter of fierce and prolonged controversy. The most opposite opinions have been set forth with ability and earnestness, but the weight they would otherwise carry is lessened by their mutually contradictory character. Notwithstanding the great influence of the physician's authority, people are perplexed by the blessings and bannings bestowed upon tobacco and the various forms of alcohol.

What is the real influence of stimulants and narcotics upon the brain? Do they give increased strength, greater lucidity of mind and more continuous power? Do they weaken and cloud the intellect, and lessen that capacity for enduring a prolonged strain of mental exertion which is one of the first requisites of the intellectual life? Would a man who is about to enter upon the consideration of problems, the correct solution of which will demand all the strength and agility of his mind, be helped or hindered by their use? These are questions which are asked every day, and especially by the young, who seek in vain for an adequate reply. The student grappling with the early difficulties of science and of literature, wishes to know whether he will be the wiser to use or to abstain from them.

The theoretical aspect of the question has perhaps been sufficiently discussed, but there still remains the practical inquiry,—"What has been the experience of those engaged in intellectual work?" Have the men of science, the inventors, the poets, essayists and novelists of our own day found advantage or the reverse in the use of alcohol and tobacco?

"Study and Stimulants" is an attempt to answer these questions. Mr. A. A. Reade has, for some years, occupied himself with this problem. The result is to appear in a work called "Study and Stimulants," or the use of intoxicants and narcotics in relation to intellectual life, as illustrated by personal communications on the subject, from men of letters and of science; and with the hope of arriving at *data* that would be trustworthy and decisive, he entered upon an independent inquiry among the representatives of literature, science, and art, in Europe and in America. The replies were not only numerous, but in most cases covered even a wider ground than that originally contemplated. Many of the writers gave details of their habits of work, and thus, in addition to the value of the testimony on this special topic, the letters throw great light upon the methods of the intellectual life. These letters, about one hundred in number, it is now proposed to publish in full, with such comments and additional matter as appeared necessary, They include communications from Dr. Charles Darwin, Professor John Stuart Blackie, Professor Dowden, Professor Leone Levi, Professor Andrew Wilson, Dr. W. B. Carpenter, F.R.S., Rev. W. H. Dallinger, F.R.S., Mr. Philip Gilbert Hamerton, Mr. Hyde Clarke, F.S.S., Professor Robert S. Ball, F.R.S., Dr. Alex. Bain, Mr. J. E. Boehm, Mr. Wilkie Collins, Mr. James Payn, Mr. Anthony Trollope, Count A. de Gubernatis, Ivan Tourguéneff, M. Plantè, M. Jules Claretie, Abbé Moigno, M. Barthélemy St. Hilaire, and M. Maxime du Camp.

Swallows.

Mr. Samuel Clark of Connorville, Lake River, says that swallows had made their appearance there on the same day of the month as they did last year, namely 21st August. We have not yet heard or seen any about Launcestown, though there are usually a good many vigilant eyes on the watch for these welcome little harbingers of spring. *Tasmanian*, 26th Aug., Swallows are mentioned as appearing at several places in Tasmania on the same date.

THEORY OF THE EVOLUTION OF THE EARTH AND MOON.*

BY THE REV. SAMUEL HOUGHTON, M.A. LL.D.

I ENTIRELY concur in Mr. G. H. Darwin's published calculations, though I differ from the physical conception he started from. The Eighteenth Century astronomers believed in the perpetual motion of the planetary system, but Nineteenth Century astronomers have discovered that the planets and stars are composed of matter similar to that of our earth, and that perpetual motion is as impossible among the planetary bodies as it is on the surface of the earth. It has been tacitly assumed, even so far back as the times of Newton and Clairaut, that the earth and planets have passed through a liquid condition before assuming the solid condition they now possess. Laplace in his nebular hypothesis also assumes the former existence of this liquid condition, and it is openly asserted by all geologists who believe that the earth consists of a solid crust (more or less thick) reposing upon a fluid or viscous nucleus.

It has been proved by Sir William Thompson, following out the views of the late Mr. Hopkins, that the present condition of the earth, taken as a whole, is such that it must be regarded as being more rigid than glass or steel. The following considerations show that it may be fairly doubted whether the earth or any other planet existed in a fluid condition.

1.—The possibility of the equilibrium of the rings of Saturn on the supposition that they are either solid or liquid has been more than doubted, and the most probable hypothesis concerning them is that they consist of swarms of discrete meteoric stones, discrete meaning that they are separate from each other in space.

2.—It is difficult to understand the low specific gravity of Jupiter and the other planets on the supposition that they are either solid or liquid, for we know of no substance light enough to form them. If the outer planets consist of discrete meteoric stones moving around a solid or liquid nucleus, the difficulty respecting the specific gravity would disappear.

3.—The recent researches connecting the periodic showers of shooting stars with comets tend in the direction of showing that comets in cooling break up into discrete solid particles, and that probably the solar nebula cooled in like manner into separate fiery tears, which soon modified by radiation into the cold of space.

Mr. Huggins's recent comparisons of the spectroscopic appearances of comets and incandescent portions of meteoric stone shows the presence in both of hydrogen and nitrogen compounds, confirming the conclusions drawn from the identity of comets and meteoric shooting-stars.

From all these and other considerations it is allowable to suppose that the earth and moon when they separated from the solar nebula did so in the form of solid meteoric stones, each of them having the temperature of interstellar space, that is, something not much warmer than 460 Fahrenheit below the freezing point of water. I entirely disagree with Sir William Thompson and others in thinking that this earth and moon were once liquid and cooled in passing through a stage of viscosity into the present condition. Mr. George H. Darwin has taken that idea of the earth and moon, and has applied his analysis to discover the laws of the earth-moon evolution in the supposition that the moon acts on the earth by producing tides in the viscous earth, in which he obtained two remarkable equations, each involving the reciprocal of the sixth power of the distance between the earth and sun. But this remarkable result does not prove any one of

* Abstract of a paper read before the American Association for the Advancement of Science, at Montreal, 28th August, 1882.

the theories of friction that have been supposed. It only shows what I would not like to say before the general public, how little mathematicians know. Mathematics cannot decide the important question between viscous earth and a cool earth of meteoric stones.

GENERAL DUANE'S SOUNDLESS ZONES.*

BY DR. JOHN TYNDALL, F.R.S.

IN reference to one of the powerful fog-whistles established on the coast of Marine, General Duane remarks as follows :—"The most perplexing difficulties, however, arise from the fact that the signal often appears to be surrounded by a belt varying in radius from one to one and a half mile, from which the sound appears to be entirely absent. Thus, in moving directly from a station, the sound is audible for the distance of a mile; is then lost for about the same distance, after which it is again distinctly heard for a long time. This action is common to all ear-signals, and has been at times observed at all the stations, at one of which the signal is situated on a bare rock twenty miles from the mainland, with no surrounding objects to affect the sound."

For a long time past, I have thought that this disappearance of the sound was due to the interference with the direct waves, or waves reflected from the surface of the sea. This explanation is capable of very accurate experimental illustration. Placing, for instance, a sensitive flame at a distance of three or four feet from a sounding reed, the flame exhibits the usual agitation. Lifting a light plank between the flame and reed, a position is easily attained where the sound, reflected from the plank, increases the flame's agitation. Lifting the flame cautiously still higher, a level is attained, reflection from which completely stills the flame. By slightly raising or lowering the plank, or by its entire removal, the flame is at once more agitated. In these experiments a high-pitched reed was used, so that it was easy to produce, by the motion of the plank, the retardation of half a wave-length requisite for interference.

In General Duane's case, a fairly smooth sea would be required for the reflection; while the position of the zone of silence would be determined by the height of the signal on the one hand and the height of the observer on the other, above the surface of the sea. The position would also, of course, depend on the pitch of the note of the whistle.

The preparation of some lectures on the "Resemblance of Sound, Light, and Heat," has recently brought this subject to mind, hence the present communication.

* Read at Royal Society, 20th April, 1882. *Proceedings*, vol. xxxiv., p. 18.

Folk-lore of Indian Iron-smelting.

There is a curious bit of superstition current in some parts of India which is worth a passing note. Babu Rashbihari Bose, in describing a visit to Kharakpúr says:—"On arriving at Cozhi, I inspected the operation of iron smelting. This was carried on only by the Kols, neither the Hindus, the Muhammadans nor the Santháls taking any part in it from some prejudice or other. The iron is smelted in an earthen oven of the form of a cylinder, coal being generally used as fuel. It is curious that the union of a man and a woman is always considered necessary for the operation, the general belief, both among the initiated as well as the uninitiated, being that the iron ore would not melt unless the fire beneath be blown with a pair of bellows worked by a man with his younger brother's wife passing her arms round his waist from behind. As far as I could judge, the metal was not completely extracted from the ore by the rude process employed. The ore is dug out from mines in the jungles."

His article appears in the Journal of the Asiatic Society of Bengal, vol. xl. pt. 1, 1871, p. 28. It would be interesting to learn if this idea is current elsewhere. X.

Our Study Table.

DARWIN AND DARWINISM. By the *Rev. S. Fletcher Williams.* (Reprinted from the *Naturalist* of September and October, 1882.)—This is an able and appreciative sketch of the great naturalist, whose loss must for ever be deplored. The paper was originally read before the Entomological Society of Lancashire and Cheshire, and well merits a wide circulation.

THIRD AND FOURTH ANNUAL REPORTS OF THE LEWISHAM AND BLACKHEATH SCIENTIFIC ASSOCIATION.—These reports contain careful abstracts of papers read before the Society, and some of these are of considerable interest, but we venture to think that the part which will be read with most interest is the account of a visit paid by the members of the Society to Down, in July, 1880. We may also call attention to the elaborate paper by Mr. J. Chaffer, "Weir on the evolution of life, with especial reference to Dr. Charles Darwin's theory of natural selection."

PLANT-LIFE; POPULAR PAPERS ON THE PHENOMENA OF BOTANY. (London: T. Fisher Unwin.) The title of this book correctly indicates its character. The author, who is a past president of the Lambeth Field Club, has had opportunities of learning what are the points of botanical interest to those only partially initiated into the mysteries of that science, and he has prepared a series of readable chapters on plant-structure, the fertilisation of flowers, the folk-lore of plants, and similar topics. These are illustrated by 148 woodcuts, which serve to make still plainer the meaning of the author.

HIAWATHA, AND OTHER LEGENDS OF THE WIGWAMS OF THE RED AMERICAN INDIANS. Compiled from original sources by *Cornelius Matthews.* (London: W. Swan Sonnenschein & Co.)—The science of popular mythology is now receiving a large amount of attention, and it is found that the tales told by the fireside from generation to generation, have interest and value for the scholar, and throw fresh light upon some of the problems of man's history and civilization. Messrs. W. Swan, Sonnenschien & Co. are devoting themselves to this department, and are surely the publishers to the king and queen of fairyland! The legends of the American Indians are best, perhaps, known to the general reader by Longfellow's beautiful poem of "Hiawatha," which is based, it is scarcely necessary to add, on the researches of Mr. H. R. Schoolcraft. From the same source the present volume has been compiled, by Mr. C. Matthews, and the result is a highly interesting collection of tales, in which the pathetic and the grotesque make a curious and entertaining miscellany.

FAIRY LEGENDS AND TRADITIONS OF THE SOUTH OF IRELAND. By *T. Crofton Croker.* (W. Swan Sonnenschein.) — The "Fairy Tales" of Crofton Croker have long held the position of classics, and it is a source of gratification to see them re-issued in this handy and elegant form. The illustrations by Maclise and Green are reproduced, but the notes and a few of the tales have been omitted for special reasons.

MANUAL OF INJURIOUS INSECTS. By *E. A. Ormerod.* (W. Swan Sonnenschein & Co.) Lecture on Injurious Insects. By *E. A. Ormerod.* (Same publishers).—We can cordially recommend the publications, large and small, by which Miss Ormerod is doing such good service to English agriculture.

A WEEK IN THE YORKSHIRE DALES. By the *Rev. John Pickford, M.A.* (Manchester: Henry Gray.) — The author of this elegantly printed little book recounts the experiences and associations of Fountains, Jervaulx, Bolton, &c. He writes in an attractive style and with a fullness of archæological and literary allusion that makes his tractate very pleasant reading.

THE BIRD OF TRUTH AND OTHER FAIRY TALES. By *Fernan Caballero.* (W. Swan, Sonnenschein.)—The talented writer, who assumed the name of Fernan Caballero, took great delight in collecting the stories told by the peasantry of Andalusia, where the greater part of her life was passed, and the English translator has made a judicious selection from those which she has recorded. It is difficult to say if the stories have received from the lady any unusual amount of literary treatment, but they have, on the whole, more spice and salt than is common in folk tales. They are terse, pointed, and even epigrammatic. Several of them, however, are favourites that are known in almost every dialect of the Aryan race.

OLD NORSE TALES, GATHERED FROM THE SWEDISH FOLK. By *George Stephens* and *H. Cavallius.* (Swan, Sonnenschein & Co.)—These tales are full of the mingled shrewdness and simplicity of the Scandinavian character. There is a consistency even in their wildest flights of fancy, and no small sense of humour. The student of folk-lore of course finds that many of them have their parallels in widely separated lands. This is one of the commonest and yet one of the strangest features of popular mythology. In spite of difference of climate, race, religion, and customs, the same strange stories are told by the hearth fire. The descent of this inheritance can in some measure be made out, but not in full. These Norse tales may be read either for their intrinsic interest as fairy tales, or may be studied as documents in the history of human culture. In either aspect they are worthy of attention. In passing we should call attention to the pretty illustrations designed by Mr. E. Lundgren.

THE JOURNAL OF SCIENCE often contains articles on subjects that appear to be avoided by many of the other scientific periodicals. In the November part there is a very interesting account of the process by which the "coaches" enable their men to pass examinations with the maximum of facility and the minimum of knowledge! One contributor puts the query, "What is an organism?" and another asks the following question, "How is it that mice, though spending their lives in absolute darkness, neither lose their colour nor their eyesight? They seem to me to have quite as little need of sight as has the mole, yet disuse of the faculty does not seem to lead into degeneration of the organ." The query is an interesting one.

SYNOPSIS OF THE CONTENTS OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND. (Taylor & Francis.)—This museum is known as one of the most important of the English scientific collections, and is indeed a storehouse of good material, a large part of which has either not been utilised, or is capable of being made to serve fresh scientific uses. The object of the collection is that of facilitating the study of the phenomena of life, both in health and disease, and the collection is therefore divided into two broad sections: first, the physiological series, containing examples of every important modification of the different structures or organs by which the functions of life are carried on; and second, the pathological series, shewing the same organs under the influence of disease or malformation. The classification of the museum, as described in the present synopsis, is mainly founded on that used by Professor Huxley in the Hunterian lectures. The main points of interest are pointed out in this excellent manual, which contains a large amount of information, useful not merely to the visitor for the time being, but worthy of a convenient place on his work-table. We are afraid that the general public are not sufficiently aware of the many interesting objects contained in this museum. It is far more wide-reaching than might be imagined, and the student, whether of physiology or of anthropology, cannot better employ some of his leisure hours than in occasional visits to this large well-arranged and carefully described collection. The literature of the museum is extensive,—Owen, Flower, Quekett, Cobbold, and others have contributed to it, and the present synopsis, though of course largely intended for popular use, is a model of its kind.

FIFTH ANNUAL REPORT OF THE HACKNEY MICROSCOPICAL AND NATURAL HISTORY SOCIETY. The report is a neatly printed pamphlet, and contains in addition to the list of excursions, &c., an inaugural address by Dr. Cooke on "The Student of Nature," and a paper by Mr. J. E. Greenhill on "Pre-historic Hackney." The latter is, we think, a capital idea, and we would commend it to the consideration of members of field clubs throughout the country. By collecting together the evidence as to the past fauna and flora of their district, they would be doing a good and useful work.

FIFTH ANNUAL REPORT OF THE EALING MICROSCOPICAL AND NATURAL HISTORY CLUB.—The report is a very brief one, but it includes a few lines about science, which were delivered at the annual meeting by its president, which are well considered and appropriate.

ELEVENTH ANNUAL REPORT OF THE SOUTH LONDON MICROSCOPICAL AND NATURAL HISTORY CLUB.—This report, although merely a pamphlet, is deserving of commendation for the very careful manner in which the papers read before the club have been abstracted, and their substance stated with a clearness and brevity that leaves little or nothing to be desired. Where a society is not prepared to incur a large amount of expense in printing, we could hardly offer them a better example than this present report.

SECOND ANNUAL REPORT OF THE WALTHAMSTOW NATURAL HISTORY AND MICROSCOPICAL SOCIETY.—This pamphlet contains the annual report, the catalogue of the cabinet, the rules of the Society, and a list of papers; but does not attempt to give any report of the papers, some of them apparently of considerable interest, which have been read before the Society.

BURTON-ON-TRENT NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY. (Birmingham: *Herald* Office.)—The Society does not give reports of its excursions or papers, but prints a very interesting "Calendar of Nature," each item being authenticated by the initials of its reporter. The plan might with advantage be adopted elsewhere.

THE NATURE OF THE HUMAN TEMPORAL BONE. By *Elliott Coues*. From the American *Journal of Otology*. (Cambridge: Riverside Press.)—This is an interesting anatomical monograph, in which the complicated subject of the temporal bone is made clearer by being treated in the comparative method. Dr. Coues is so well known as an ornithologist, that people are apt to forget the claims he has to distinction as an anatomist. This essay may serve as a pleasant reminder.

A DAY'S ELEPHANT HUNTING IN ESSEX. By *Henry Walker, F.G.S.* (Epping Forest Field Club.) Under this startling, not to say sensational title, Mr. Walker has given an interesting sketch of the palæontology of the district in which was found the first perfect skull of the British mammoth. It is two years since the lecture was delivered, but there must still be many to whom it would be profitable and fresh with the wonder and freshness of a fairy tale.

CARDIFF NATURALISTS' SOCIETY: REPORT AND TRANSACTIONS. Vol. 13. (London: J. David).—The Cardiff Naturalists' Society is a large and active one, and the present volume, although somewhat miscellaneous in its contents, contains a good deal of interesting matter. Perhaps we shall best criticise by indicating the nature of the contents. The first paper is the inaugural address of Mr. G. E. Robinson, the president, who takes a bird's eye view of Welsh pre-historic archæology. Mr. William Ronfeldt calls attention to some curiosities of language. Dr. C. T. Vachell describes a week in the country. Mr. John Gavey discourses on the telegraph, microphone, and photophone; and his paper is illustrated by several useful diagrams. Mr. F. Sonley Johnstone speaks of science as a branch of education. Mr. T. Harry Riches contributes a paper on the Arctic midnight sun, and other phenomena. Mr. F. G. Evans speaks on the influence of the electric light on vegetation, and also describes the Sanding Glass Cromlechs. Mr. John Pritchard describes Margan Abbey. Mr. Robinson describes the carantorius stone. The Rev. W. C. Bruce lectures on the moon. Mr. T. W. E. David brings forward the evidences of glacial action in the neighbourhood of Cardiff. Mr. A. C. F. Calaminus narrates some German legend. The Rev. W. E. Winks contributes some notes on a South Wales pottery, and Mr. F. G. Evans reports on the meteorology of the district for 1881.

THE MICROSCOPICAL STRUCTURE OF ROCKS.

BY GEORGE H. HURST.

I.—INTRODUCTORY.

IN the present series of papers it is proposed to describe as briefly and concisely as possible the manner in which the microscope is applied to the study of rock structure, or petrology, as this branch of investigation is often called. Without making any profession of great originality, it is hoped that sufficient information may be given to enable the reader to acquire an elementary knowledge of this new and interesting branch of study.

It does not need a special form of microscope for this study; but it should be fitted with a polariscope, and, if possible, a revolving stage. Both are much used in examining rock structure, in fact, the polariscope is indispensable, especially in examining crystals. If the polariser and analyser are constructed so that they can be thrown into or out of use at a moment's notice, it would be a great advantage. A very convenient microscope for petrological work is made by Swift and Sons, of Tottenham Court Road, London. This instrument is fitted with a revolving stage, adjusted so that the object shall always remain central; to an arm under the stage is fitted the polariser, so that it can be thrown in or out of use as required. The analyser is placed in a sliding box just above the objective, and, like the polariser, can be brought into use or drawn out when required, without taking the eye away from viewing the object—a convenience unknown with the ordinary forms of instruments, but of great value in examining the optical properties of minerals met with in rock. In the best instruments for advanced work, the edge of the revolving stage is graduated into degrees, as is also the rim of the polariser, so that the amount of rotation can be ascertained: for ordinary purposes this is not needed.

The preparation of rock sections is a troublesome but not exceptionally difficult matter. The chief requirement is a great stock of patience and perseverance on the part of the operator. The simplest way to make these sections is to first procure a thin chip or slice of the rock you want to examine; these may be broken off the general mass with a hammer, or if the mass is small, to place it on the edge of a cold chisel let into a block of wood, or held in the jaws of a vice, and strike it with a hammer. Having obtained a piece about an inch square, and rather less than an eighth of an inch thick, the next thing is to grind one side flat. This can be done by grinding it by hand on a glass plate or a cast-iron plate with fine emery and water, care being taken to grind with a circular motion, and to use all parts of the plate, so as not to wear it into grooves. After a flat surface is obtained it requires polishing, which is done by washing it, and re-grinding with finer emery at first, finishing with rouge. The chip is now cemented by this face to a piece of glass by means of hard Canada balsam. If the operator does not object to having scratched glasses in his cabinet, let the chip be cemented to the glass on which it is to remain; it will save a little trouble in uncementing the chip at the finish and re-mounting it on to a new piece of glass, with the possible danger of accidents happening.

When the balsam is properly dry and thoroughly hard, the section must again be subjected to the grinding and polishing process, on its new face, until it is sufficiently thin to permit light to pass through. It then only requires covering with glass to protect it from becoming scratched, and the section is finished and ready for use.

Machines are made for cutting and polishing sections, which reduce the labour to a minimum; the results are, however, the same.

II.—THE GENERAL STRUCTURE.

When we apply the microscope to the study of the three chief kinds of rocks—the aqueous,

the igneous, and the metamorphic—we find in aqueous rocks a granular structure, with evidences of their having been built up by organic agencies, only occasionally do we find anything approaching a crystalline structure. While on the other hand the igneous and metamorphic rocks almost always show a crystalline structure; sometimes they are homogenous, or exhibit no structure at all.

When sections of such rocks are viewed by the microscope, they are seen to come under two heads: 1st, they may be built up entirely of crystals, as are granites, syenites, &c.; or, 2nd, they may consist of a ground mass, through which is diffused crystals of various minerals. Lavas, basalts, &c., belong to this division.

The ground mass or base may be of—1st, a vitreous or glassy nature shown by its appearing under the microscope as a homogenous mass, perfectly transparent, and undistinguishable from glass, whence its name, and like glass does not affect polarised light, and therefore, with crossed nicols, appears dark; 2nd, of a crypto-crystallised structure, where the base is full of rounded grains or imperfect crystals, or, as they are termed, microliths; 3rd, of a micro-crystalline character, where the base is full of minute but perfect crystals, which appear with crossed nicols as points of variously coloured lights. As we proceed in our studies we shall have many examples of such bases.

These minute crystals are known as crystallites, and in their progressive development represent the various forms and conditions of mineral matter, from its departure from an amorphous state, to that of a perfect crystal. It is, however, only under exceptionally favourable circumstances that the particular mineral can be determined.

These crystallites can be conveniently divided into microliths, trichites, belonites, and globulites.

Microliths are imperfectly crystallised particles.

Trichites are perfectly crystalline particles of an opaque character; they are usually hair-like in form, assuming a great variety of shapes, some straight, some curved into various fantastic forms, whilst others cross and interlace in many ways; sometimes they are globular in form, and arrange themselves in lines, which are often at right angles to one another, or in concentric layers, to build up the nucleus of a crystal, while, as in the famous pitchstone of the Corriegills, Arran, these trichites arrange themselves into beautiful feathery forms in the midst of a glassy base; under a high power, it is seen that the base all round these feathery forms is perfectly transparent, while the rest is more or less opaque, as if at one time these little trichites were uniformly distributed throughout the mass, and then some congregated together into the forms we now see, leaving the spaces they formerly occupied clear and transparent.

Belonites are crystalline particles of a transparent character, and resemble trichites in the variety of their forms.

Globulites, or embryo crystals, the minute round particles round which crystallites eventually build themselves up into crystals.

In rocks having a crypto-crystalline base the crystallites frequently arrange themselves into rounded particles, which have a radiated structure, known as sphærulites, which vary much in size, sometimes almost microscopic, at others as large as a walnut, while occasionally they are met with as big as a man's fist. Some of the varieties of obsidian found in Iceland, and at Vulcano, exhibit this sphærulitic structure.

Fluidal structure is met with in some lavas, where the larger crystals are all arranged with their long axes in one direction, while the crystallites have their long axes in the same direction, and are peculiarly arranged with regard to the large crystals. These have at one end a number of crystallites attached, while the other end is quite free, exactly in

the same manner as the small floating particles in a river attach themselves either to fixtures, such as piers, piles in the stream, or to larger floating particles. This structure shows that the rock mass must have been formed in a state of motion, and hence the term fluidal structure.

Banded structure is frequently met with in lavas and obsidians; a notable instance is the banded rhyolite found at Bartos Leholka, in Hungary. It is sufficiently indicated by its name. Rocks which have this structure always have a tendency to split into thin layers or laminæ; it is probably caused by the rock having been subjected to great pressure.

Perlitic structure, so named from the rocks having a pearl-like lustre, is caused by the rock being traversed by innumerable small cracks, which are of two kinds—rectilinear and curved—the curved always being within the spaces formed by the intersection of the rectilinear lines. This is found well developed in the perlites, especially that found near Meissen in Saxony. The structure has most probably been produced by the rock having been rapidly cooled from a state of fusion. It can be produced artificially by fusing hard Canada balsam, and then rapidly cooling it.

Some Queries relating to Horses.

BY A. RAMSAY, F.G.S.

1.—What is the cause and explanation of Loodiana fever in horses?

2.—What is the cause of the disease called Kummissee, which is a kind of paralysis of the loins?

3.—How do the entozoa get into the eyes of the horse?

Tennyson and the Yew-Tree.

Can any of your readers inform me to what Tennyson refers when he makes Ambrosius to say, in the Holy Grail—

> O brother, I have seen this yew-tree smoke
> Spring after spring for half a hundred years.

W. B. COCKILL.

The High School, Roundhay.

BIRDS' NAMES.

MR. WILLIAM ALLINGHAM, one of the most graceful of verse writers, has just issued a dainty little volume of poems entitled "Evil May Day" (London, David Stott), which can be safely commended to all lovers of pure English. One of these we transfer to our pages.

Of Creatures with Wings, come now let us see
Which have names like you and me.
Hook-nosed Poll, that thinks herself pretty,
Everyone knows, of all birds most witty,
Daw our good friend, in grayish black,
If you ask him his name, will answer "Jack!"
Bold Philip Sparrow hopping you meet,
"Philip! Philip!"—in garden and street.
Robin Redbreast perches near,
And sweetly sings in the fall of the year.
Grave Madge Owlet hates the light
And shouts "hoo! hoo!" in the woods at night.
Sweet Nightingale, that May loves well,
Old Poets have call'd her Philomel,
But Philomelus, *he* sings best,
While *she* sits listening in her nest.
Martin! Martin!—tell me why
They call you so; I know not, I;
Martin the black, under cottage eaves,
Martin the small, in sandy caves.
Willy, Willy Wagtail, what runs he takes!
Whenever he stops, his tail he shakes.
Head and tail little Jenny Wren perks,
As in and out of the hedge she jerks,
Brisk Tom Tit, the lover of trees,
Picks-off every fly and grub he sees.
Kitty Wake on the sea-wave rides,
Her nest on the lofty cliff abides.
Mag, the cunning chattering Pie,
Builds her home in a tree-top high,—
Mag, you're a terrible thief, O fie!
Tom and Philip and Jenny and Polly,
Madge and Martin and Robin and Willy,
Philomelus and Kitty and Jack,—
Mag the rogue, half white, half black,
Stole an egg from every Bird;
Such an uproar was never heard;
All of them flew upon Mag together,
And pluck'd her naked of every feather!

WEEDS AND THEIR SEEDS.*

BY E. L. STURTEVANT, M.D.

WEEDS show a most remarkable fecundity. It becomes impossible to select an average plant, as the growth varies so much in localities. We have, however, selected plants representing vigorous plants, and the average plant of our fields. The number of species of weeds upon the Station farm is quite large, and the number which can start on a limited area is very surprising. June 22nd, a single square foot of ground in our pear orchard, that has been ploughed and harrowed this season, was found to obtain 356 growing plants, comprising 7 distinct species, not counting grasses or clovers. At the same date our forage plat contained 24 species of weeds, our lawn 13 species, our fields 30 species, and our garden 23 species.

On September 28th, one vigorous purseley plant (*Portulaca oleracea*) contained 9 branches, the average branch 15 branchlets, the average branchlet 212 seed capsules, one average seed capsule 75 seeds, thus making for an estimate a grand total of 2,146,500 seeds.

June 21st, an average plant of shepherd's purse (*Capsella bursa-pastoris*) contained about 1,000 pods, each pod at least 20 seeds, and more blooms to come. A better specimen showed 2,200 pods, and still blooming; a vigorous specimen had 4,400 pods at least, and still blooming. The number of seeds to a plant may therefore be estimated at from 20,000 to 80,000. A fair sample of mallow (*Malva rotundifolia*) had 1,100 blossoms and more to come, each bloom producing 15 seeds; the estimate for the plant therefore is 16,500.

A fair sample of chick-weed (*Stellaria media*) showed 123 flowers and capsules, each of which produced from 7 to 10 seeds. A better plant showed 471 capsules, and many had opened and fallen. This plant flowers during a very long season, and the number of seeds upon the plant at one time may be safely estimated at from 1,000 to 4,000.

A plant of corn speedwell (*Veronica arvensis*) showed 43 pods, with 90 seeds to a pod. A more vigorous plant showed 175 pods and about 101 seeds to a pod; another plant had 78 pods, and still another 123 pods. The number of seeds can therefore be estimated at from 4,000 to 15,000 to the plant. A specimen of the thyme-leaved speedwell (*Veronica serpyllifolia*) had 142 pods, with about 58 seeds to the pod, or an estimated number of 8,000 seeds to the plant.

A fair, rather smallish plant of black mustard (*Sinapis nigra*) had about 120 blossoms and pods. One pod had 15 seeds; the estimate, therefore, is 1,800 seeds to the plant.

It does not require a very vigorous dandelion (*Taraxacum dens-leonis*) to throw up 10 or 20 blooms in a season, yet each head may contain 120 seeds or more, or from 1,000 to 2,000 to the plant.

A fair sample of curled dock (*Rumex crispus*) had 9 stems; one stem selected as an average one had 21 flower spikes, one average spike counted 369 blooms. A single stem had, therefore, about 7,750 blooms, and the 9 stems about 69,000 blooms. A larger plant in the garden had 10 stems, the largest stem had 41 seed spikes, the smallest 20 seed spikes, the largest spike had 630 whorls, the smallest 219 whorls. The computed number of seeds is therefore at least 93,390.

On July 1st a vigorous plant of cockle (*Lychnis githago*) had 60 pods and blossoms; 2 seed pods had 49 and 62 seeds respectively; the total number of seeds may therefore be computed at 3,300.

On June 25th, an average flower of the ox-eye daisy (*Leucanthemum vulgare*) contained 802, and another flower 859 achenes to the flower. One plant had 72, and another plant had 120 blooms. While often there is but one stem to a seed, yet frequently there are

* Extract from an article in the "New York Experiment Station Bulletin."

more, up even to 23. One stem may have 13 blooms. The number of seeds to a plant may therefore be computed at from 8,000 to 96,000 seeds.

On July 6th, a fair stool of chess or cheat (*Bromus secalinus*) had 211 heads, and an average head had 18 seeds; the estimated number of seeds is 3,798.

A fair sample of corn chamomile (*Anthemis arvensis*) had 151 seeds to the flower, and 48 flowers to a stalk. This plant has from 1 to 10 stalks. The seeds can, therefore, be computed at from 7,000 to 70,000 to a plant.

On July 12th, a vigorous plaintain (*Plantago major*), had 8 flower spikes, and one of these, not the largest, had 561 blooms.

On August 29th an averaged sized plant of pig-weed, (*Chenopodium album*) had 28 branches. One branch bore 21 branchlets. One average branchlet bore 13 flower spikes. One average spike contained 108 seeds. The computation for the plant is, therefore, 825,552.

Berlin's Ancient Tree.

The *American Register* of Paris, says that Berlin may boast of a very old tree. It is of the species *Taxus baccata*, stands in the garden of the "Herrenhaus" (Upper Chamber Building), and is over 800 years old. Its height is about 38 feet, and its lower circumference about 5 feet. As a forest tree this particular species is apparently wholly extinct—the fact of its being met with, inside the city walls, is a rarity all the greater, considering the remarkable size of the specimen in question. The premises, among numerous successive proprietors, were once owned by the father of Felix Mendelssohn Bartholdy; the first execution of the immortal composition, "A Summer Night's Dream," took place in this very garden. At the time the Upper Chamber Hall was erected on the site, it was King Frederick William IV. who saved the venerable tree from destruction. Emperor William remembers it well. When, in 1866, on the return of the regiments of the Guard from Bohemia, a festival was given in the garden, the Emperor's stand was erected at the foot of the historical tree.

SCIENCE AT THE PATENT-OFFICE.

WE are afraid that the value of the records of the Patent-Office are not sufficiently known. The publications of the Commissioners of Patents contain an immense mass of documents relating to the progress of industrial science. The extent of these documents is indeed appalling. In the first place, there are 13,561 distinct specifications of inventions, for which patents were issued before the reform of the law in 1852. The "old law" specifications range from the year 1617 to 1852, make about 691 thick volumes, and their total cost price is about £600. There are then the specifications of patents issued under the new law. These down to December, 1881, amounted to 113,379 blue-books, forming 2882 volumes, and having as their total cost price £3248. To facilitate reference there are a lengthy varied series of indexes by which the name of any inventor and the subject of any invention can be fairly ascertained. There is also a supplement containing the following tracts:—

1. Metallica; or the Treatise of Metallics, briefly comprehending the doctrine of diverse new metallical inventions, &c. By Simon Sturtevant.

2. A Treatise of Metallica, but not that which was published by Mr. Simon Sturtevant, upon his Patent, &c. By John Rovenzon.

3. A Commission directed to Sir Richard Wynne and others to inquire upon oath whether Nicholas Page or Sir Nicholas Halse was the first inventor of certain kilnes for the drying of malt, &c., &c.

4. Dud Dudley's Metallum Martis; or iron made with pit-coale, sea-coale, &c.

5. Description of the nature and working of the Patent Waterscoop Wheels invented by William Wheler, as compared with the raising wheels now in common use. By J. B. W. Translated from the Dutch by Dr. Tolhausen.

6. An exact and true definition of the stupendous Water-commanding Engine in-

vented by the Right Honourable (and deservedly to be praised and admired) Edward Somerset, Lord Marquis of Worcester, &c., &c.

7. Navigation improved; or the art of rowing ships of all rates in calms with a more easy, swift, and steady motion than oars can. By Thomas Savery.

8. The Miner's Friend; or an engine to raise water by fire, described, &c. By Thos. Savery.

9. Specimina Ichnographica; or a brief narrative of several new inventions and experiments, particularly the navigating a ship in a calm, &c. By John Allen, M.D.

10. A description and draught of a new-invented Machine for carrying vessels or ships out of or into any harbour, port, or river against wind and tide, or in a calm, &c. By Jonathan Hulls.

11. An historical account of a new method for extracting the foul air out of ships, &c., with the description and draught of the machines by which it is performed, &c. By Samuel Sutton, the inventor. To which are annexed two relations given thereof to the Royal Society by Dr. Mead and Mr. Watson.

12. The letter of Master William Drummond for the construction of machines, weapons, and engines of war for attack or defence by land or sea, &c. Dated the 29th September, 1626.

13. Contributions to the History of the Steam Engine, being two deeds relating to the erection by Messrs. Boulton and Watt of steam engines on the United Mines at Gwennap, Cornwall, and at Werneth Colliery, near Oldham, Lancashire. From the originals in the Patent-Office Library.

These, it will be seen, relate to many interesting points in the history of inventions. The great size of the collected specifications suggested another series of publications. It was thought that it would be a convenience to many to have abridgements in a handy form of the specifications of those subjects in which they were more particularly interested. These abridgements now form a lengthy series. They consist, of course, mainly of condensed particulars of each "invention," good, bad, or indifferent, that has received that amount of protection guaranteed by letters patent, together with references to the fuller specification, &c., but many of the volumes have also introductions in which the general history of the topic is sketched. Amongst those issued we would call attention to "Electricity and Magnetism" (now extending to seven parts); preparation of indiarubber and gutta-percha; photography, in which the rise and progress of that delightful art can be traced from birth to maturity; plating and coating metals; writing instruments; railway signals; acids, alkalies, oxides, and salts; aeronautics; tobacco; needles and pins; ventilation; steam engine; air, gas, and other motive power engines; optical, mathematical, and philosophical instruments; purifying and filtering water; agriculture, &c., &c. The abridgements are now ninety-nine in number, and form quite a small library in themselves.

We believe that these abridgements and their historical introductions were the suggestion of the late Mr. Bennett Woodcroft who previous to the issue of the general series brought together all the specifications relating to reaping machines, and supplemented them by an interesting sketch of such agricultural implements from those of Egypt downwards,

This brief and necessarily imperfect account will, we hope, make known to some who had hitherto overlooked them, the valuable scientific material, and especially the valuable material for the history of science is contained in this useful and important series of the publications of the Patent-Office.

Octopus at Llandudno.

Mr. William Jones, formerly the hon. sec. of the United Field Naturalists' Society, was recently walking on the sands at Llandudno, in company with Mr. L. Tetlow, of Oldham, when they espied and captured a fine specimen of the *Octupus vulgaris*. It is the first that has been caught in that locality.

THE METHOD OF SCIENTIFIC OBSERVATION.

BY THE LATE PROFESSOR JOSEPH HENRY.

[The following extract from the address delivered by Prof. Henry, as President of the Philosophical Society of Washington, is as fresh and apposite now as when it was first delivered by its lamented author, 24th Nov, 1877.]

THE general mental qualification necessary for scientific advancement is that which is usually denominated "common sense," though added to this, imagination, invention, and trained logic, either of common language or of mathematics, are important adjuncts. Nor are objects of scientific culture difficult of attainment. It has been truly said that the "seeds of great discoveries are constantly floating around us, but that they only take root and germinate in minds well prepared to receive them." The preparation, however, is not difficult, and many possess the requisites in an eminent degree who are not aware of the fact. Genius itself has been defined as a mind of general powers determined, enthusiastically it may be, on one pursuit. The method of discovery or scientific observation is not difficult. There is a story in a work, entitled "Evenings at Home," which produced an indelible impression on my mind. It is entitled "Eyes and no Eyes," and relates to two boys who started on a walk during a warm summer afternoon. On their return, one was fatigued and dissatisfied, having seen nothing, encountered only dust and heat, while the other was charmed with his walk, which had been over the same ground, and gave a glowing account of the objects he had met with, and of the reflections which were awakened by them. On this story De la Béche has founded a work, entitled "How to Observe in Geology," which I would commend to the attention of every member of this Society, while I suggest that good service would be done to the advance of knowledge were a similar work published relative to all branches of science. The first requisite for an observer is, that his mind should be actively awakened to the phenomena of nature with which he is surrounded. Thousands of persons of excellent mental capacity pass through the world without giving the slightest attention to the ever-varying exhibitions which are presented to them. The sun rises and sets, the seasons change, the heavens every night present new aspects, but these to them are matters of course; they excite no interest, and it is only when some extraordinary phenomenon occurs, such as the blazing comet or the startling earthquake, that their attention is arrested. Another requisite is, the power of the perception of truth, which enables the observer to recognise and define with unerring accuracy what he has seen without any tinge of color from *à priori* conceptions. Still another is, the faculty of eliminating accidental conditions from those which are essential; and further, the characteristic of perseverance is indispensable. The fields of scientific labour may be divided into two classes, viz., those which relate to the empirical observation of facts, and those which refer to the systematic series of investigations relative to the law or cause of special phenomena. As illustrations of the first class are the facts of the phenomena of the physics of the globe, those of ordinary meteorology and natural history; while, as examples of the second, we have the phenomena of chemistry, physics, and astronomy. The remarks which I have previously made relate principally to the former. In order to elucidate the method of investigation in the latter case, I will suppose the existence of a new phenomenon which is unconnected with any of the present generalisations of science, but of which it is desired to discover the law or the facts with which it is associated. Such facts standing alone form no part of science; they are usually discovered in the course of investigations, and are of great importance in pointing out fields of

new research, which promise an abundant harvest. The first step in the investigation is to reproduce the phenomenon, the next is to form in the mind a provisional hypothesis as to its cause, and in the choice of this we are governed by analogy. For example, if it appears to resemble some of the phenomena of electricity, we assume that it is produced by electricity; we next endeavour to ascertain by what known action of electricity such an effect could possibly be produced; for this purpose we invent an hypothesis, or imagine some peculiar action of electricity sufficient to produce the effect in question; we then say to ourselves, if this be true, it will logically follow that a specific result will follow if we make a certain experiment; the experiment is devised and tried, but no positive result is obtained. In order to this negative result, the logical deductions must have been in error, or the experiment must have been defective, or the hypothesis itself erroneous. We examine each of the two former steps, and finding nothing amiss with them, we conclude that the hypothesis was not true; another hypothesis was then invented, another deduction inferred, and another experiment made: still no result is obtained. At this stage of the research the inexperienced investigator is prone to abandon the pursuit; not so he who has successfully attempted to penetrate the secrets of nature. Undeterred by failure, he changes from time to time his hypothesis, makes new guesses, and again repeats the question as to their truth by means of experiment, until at length nature, as if wearied by his solicitations, grants him a new and positive result; he has now two facts, and an hypothesis to explain them; from this hypothesis he makes a new deduction, which is also tested by a new experiment; but now, perhaps, he obtains a result, which, although of a positive character, is not what he expected. He has, however, made an advance; he has three facts and an hypothesis to explain two of them. In this case he does not usually abandon his preconceived idea, but modifies it until it includes the new fact. With the hypothesis thus improved, he deduces, it may be in rapid succession, a number of new conclusions, the truth of all which is borne out by the results of the experiments. The investigator now feels that he is on the right track, that the thread of Dædalus in his hand, and that he will soon be in the full light of day, but usually the escape from the labyrinth is not so easy. In the height of his successful career it not unfrequently happens that a result is obtained diametrically opposed to his previous generalisation, which conclusively forces upon his mind the conviction that he is still far from attaining his end; that he has not yet seized upon the fundamental principle of the phenomena, which have grown into a class under his hands. At this stage of the inquiry, his self-esteem is much depressed, he throws aside for a while his apparatus, refers to his library for new suggestions. The subject, however, is not discharged from his mind; it still goes with him, and is perpetually recurring; it is mingled with his dreams, and is seen associated with the every-day occurrences of life, until at length, in some happy moment of inspiration, it may be after refreshing sleep, the truth flashes upon him; he catches a more extended conception of the relations of the phenomena; a more comprehensive hypothesis is suggested, from which he is enabled to deduce in succession a large number of new conclusions to be submitted to the test of experiments. These are all found to yield the expected results, and the generalisation which has thus been obtained is more than an hypothesis. It is entered to the name of a verified theory. The investigator now feels amply rewarded for all his toil, and is conscious of the pleasure of the self-appreciation which flows from having been initiated into the secrets of nature, and allowed the place not merely of a humble worshipper in the vestibule of the temple of science, but an officiating priest at the altar.

In this sketch I have given of a successful investigation, it will be observed that several faculties of the mind are called into operation. First, the imagination, which calls forth the forms of things unseen, and gives them a local habitation, must be active in presenting to the mind's eye a definite conception of the modes of operation of the forces in nature sufficient to produce the phenomena in question. Second, the logical power must be trained in order to deduce from the assumed premises the conclusions necessary to test the truth of the assumption, in the form of an experiment, and again, the ingenuity must be taxed to invent the experiment, or to bring about the arrangement of apparatus adapted to test the conclusions. These faculties of the mind may all be much improved and strengthened by practice. The most important requisite, however, to scientific investigations, of this character is a mind well stored with clear conceptions of scientific generalisations, and possessed of sagacity in tracing analogies and devising hypotheses. Without the use of hypotheses or antecedent probabilities, as a general rule no extended series of investigations can be made as to the approximate cause of casual phenomena. They require to be used, however, with great care, lest they become false guides which lead to error rather than to truth. It is not enough for a physical investigation that we have the simple idea, which may be embodied in a mathematical equation; we must see clearly, with the mind's eye, the operations in nature, and how the phenomena are produced in accordance with the well-known laws of force and motion.

Had the Babylonians a Sabbath?

Mr. Theo. G. Pinches, in describing "Two Ancient Babylonian Calendars now in the British Museum," says that in neither is there any mention of a regular Sabbath, nor of sacred days, but only of lucky days. Is there any other evidence that they had the seventh day rest? S. A.

Cat attacked by two Blackbirds.

A correspondent of the *Daily News*, of June 7th, writes:—"The following extraordinary and touching scene was witnessed by a gentleman in his garden at Maldon. A fledgling blackbird, evidently just escaped from its nest close by, had with some difficulty fluttered from a fence into the overhanging branches of a lime tree. A cat also had observed the young 'flyer,' and immediately gave chase, rushing up the stem of the tree, with the intention of getting on to the branch to obtain her prey; but meanwhile the parent birds had come upon the scene, and seeing the situation of their nestling, attacked the cat with the utmost bravery, trying to prevent her crawling on to the branch. They kept alternately flying at her, using their beaks and wings incessantly with the utmost fury, and getting fearlessly within range of the cat's claws, and while one was pouncing at her head, the other would execute a 'flank' attack, both of them keeping up all the time that continuous, noisy, angry, chatter which blackbirds so well know how to make on occasion. These bold strategic movements confused the cat very much, as her position in the tree was not advantageous, but she kept snarling, and striking out with her talons whenever an opportunity occurred. The interested observer tried to help the birds, but, from the lower branches of the tree intervening, missiles were not of much use. He was obliged to leave the exciting scene, but after a long absence returned, and found the combat still going on, and a person who had watched during the interval, said the two birds had kept up the attack without ceasing, forcing the enemy to keep on the defensive only; and this desperate struggle kept on for two hours, till the birds were completely exhausted, and sat, 'all in a heap,' looking as though they had lost half their feathers. But they had kept the destroyer from their little fledgling, and their friend at last managed with some trouble to dislodge the cat. In the afternoon the birds seemed quite to have recovered themselves, and were singing victoriously in the garden in celebration of what, perhaps, was one of the longest and pluckiest fights of the kind that has ever been known.

THE POETRY OF WATERWORKS.

THE late Alexander Smith, with that rashness which sometimes marks the "poet in his youth," once declared that "love, love is the song which the bard ever singeth." This reckless assertion is, of course, contradicted by a thousand volumes that lie forgotten in the libraries of the curious. So far from love being the only theme of song, it would be difficult to name anything in or out of nature that has not been celebrated or satirised in rhyme. Garth sung of the "Dispensary," Thorius wrote a "Hymn to Tobacco," and Cowper descanted on the "Sofa." Joel Barlow, the first modern American poet—in point of date we mean—not only celebrated the glories of Columbus, but also chanted the praise of "Hasty Pudding." Nor do uncommon themes commend themselves less to the Eastern mind, as two recent instances from China will serve to show. At Shanghai a poet has arisen, and indited an ode, which is said to combine elegance with morality, on the theme of the waterworks of that famous city. We are aware that nearer home there are cities whose mountain reservoirs have been made the subject matter of song, but we think the palm of poetic daring must be conceded to the Chinaman. With a surprising touch of genius, he describes the water-pipes as so many sable dragons. It may, perhaps, be objected that dragons, whatever they may happen to be, and wherever they may chance to be found, are not usually supposed to be so beneficially employed as in the work of supplying a great town with the water needed for its health and industry. This however, it must be confessed is, after all, a mere matter of detail, and it would be cruel to press too hardly upon a poet, who, abandoning the praise of the butchery of the battle-field, tunes his lyre in appreciation of civic enterprise and public spirit. The poet finds that the waterworks are an allegory. Thus—to quote a Shanghai contemporary's analysis of the ode—the filthy water of the river is a type of the gross immorality of Shanghai and its purlieus, and the natural impurity of the human heart. Whether a man becomes contaminated by the temptations around him depends upon himself and his own strength of mind. "Do you not "know that when the Holy Man appears the "Yellow River becomes clear, and the silver "streams are tilted up to wash the munitions "of war?" The admirers of the unintelligible in verse will at once preceive that they have here lighted upon a perfect gem of obscurity. It is said by the poet's admirers to be an allusion to the establishment of universal peace. in which case it may be feared that the Holy Man is, unfortunately, not likely to put in an appearance for some time. Not to be outdone, another Shanghai poet has taken in hand the Electric Light Company. As we read in the Shanghai paper, the directors are described as snatching the flying lightning from the void of heaven, and enclosing it in a glass globe, from which pours forth a sea of molten silver. "The radiance is like that of "intensified moonlight, or the leaping fires of "the rainbow; winds may blow and showers "may fall, but the lustre shines on unharmed. "Shanghai will now become the Nightless "City: even ladies will cease to need candles "on their toilet tables, for the very mainsprings "of heaven are now at the disposal of man-"kind." Poets are sometimes regarded as dreamy and impracticable, but this Celestial genius has evidently a keen eye to business, for his glowing outburst ends with an earnest aspiration for the sale of myriads of the electric lamps. What would Alexander Smith say to these bards of sweetness and light?—*Manchester Guardian.*

Will-o'-the-Wisp.

What is the real nature of the phosphorescent appearance known as the will-o'-the-wisp? N.

Salford.

PUPATION OF THE NYMPHALIDÆ.

BY C. V. RILEY.

[Abstract of a paper read before the Washington Philosophical Society in 1879.]

THERE is no more interesting phenomenon in insect transformation than the withdrawal of the chrysalis from the shrunken larval skin, and its firm attachment to the button of silk previously spun by the larva, in those *Rhopalocera* which suspend themselves perpendicularly during pupation. For a century and a half Reaumur's account, namely, that the soft segments of the forming chrysalis acted the part of legs by grasping the larval skin between the sutures, has been accepted and generally copied. Dr. J. A. Osborne, of Milford, England, first drew attention, two years ago (in *Nature*, vol. xvi., pp. 502-3) to the fact that there was a membrane concerned in the act; and Mr. W. H. Edwards, of Coalburgh, West Virginia, corroborated Dr. Osborne's statement, by observations on some of our American species recorded in the *Canadian Entomologist* of last December. Prof. Riley records the result of a number of observations on this subject, and thus explains the philosophy of the act which has so generally misled observers. His studies have been made principally with the larva of *Vanessa antiopa*. One of the means by which the chrysalis holds on and rises at the critical moment is a stout ligament, which is, virtually, the shed intestinal canal, not alone the lining, but the whole organ, which, as we know, becomes sub-obsolete in the imago state of so many *Lepidoptera*. It is the ilium and colon, more particularly, which are serviceable, and the ligament holds with such force around the anus of the cast larval skin that it cannot easily be severed. The rectum of the nascent chrysalis draws this in, or lets it go, by peristaltic action of the sphincter muscles, the whole ligament being drawn out as soon as the hooks of the cremaster reach the silk. In addition to this ligament, which is of a reddish color, there are two lateral ligaments, also quite long and strong, and of the colour of the skin, which serve as auxiliaries. These are the shed linings of the tracheæ issuing from the last or ninth pair of spiracles, which in the chrysalis become closed or blind. These ligaments may be called the tracheal ligaments, and seem to be somewhat specialized to aid in this important act. Lastly, there is the membrane proper, referred to by Dr. Osborne, which is virtually but the anal portion of the mucous lining of the skin itself, or corium, caught upon the knobs at the end of the ridges, which usually form the ventral part of the cremaster. It consists chiefly of the skin that lines the region of the rectum and the anal prolegs, and takes on a more or less bifurcated form from the pulling power of the knobs during the act of withdrawal from the skin. The ligaments Prof. Riley considers constant physiological factors in the problem, most necessary in those species which have the knobs imperfectly developed, and acting even during the larval molts, and so holding the shed skin of *Lepidopterous* larva that it is worked to the anus in a shrivelled mass, as a stocking is pushed to the toes; whereas in most other insects, and especially in those where the metamorphosis is incomplete and the change in the intestinal canal but slight, the *exuviæ* are crawled out of rather than worked off, the anal parts not being held within the end of the molted skin, but really being the first parts detached. The membrane is a purely mechanical factor, and may not always be properly caught and drawn out. It may also be severed without necessarily causing the chrysalis to drop. Yet that it is an important aid to the rising of the chrysalis there cannot be much doubt, and we find, in the chrysalis of *Padhia glycerium* for instance, a totally different mechanical provision for clutching the membrane, namely, a notch between the

ridges around the rectum in which the base of the membrane may be caught, the ridges being, in this species, very narrow, smooth, and shallow, and the ordinary ventral knobs obsolete.

Physiological effects of Coffee.

According to long experiments made in the Rio Museum by Drs. Guimarães and Raposo, on strong dogs, which were first subjected for some time to solely beef alimentation, and afterwards to exactly the same food with the sole addition of moderate doses of infusion of coffee, it was found that the dogs ate one-third to two-fifths more beef, but did not increase correspondingly in weight, coffee increasing the consumption of meat, but diminishing, or not augmenting, that of farinaceous and fatty food in dogs allowed to eat as much as they wished of one kind of aliment.

Farther, dogs died of starvation at the end of 25 to 35 days, when fed solely on boiled farina or on fat of pork, and in 14 to 20 days when given coffee also.

Dogs died of starvation in 24 to 31 days, losing 108 grammes per diem, and 16 grammes per kilogramme; but with daily doses of 40 to 160 grammes of strong infusion of coffee they died in much shorter time, and lost on the average 27 grammes per kilogramme.

With doses of 160 to 300 grammes of very strong infusion of coffee, dogs fed on raw beef at will, or in fixed quantities, died in 3 to 7 days.

In his report Dr. Couty thinks that these experiments prove that the use of coffee, at least in moderation, is advantageous, as it excites the functions, and consequently the waste.

The weak point of the experiments is that they were made on dogs, and are, perhaps, not conclusive as to men. We suggest, therefore, that, by higher order Drs. Guimarães Raposo, and Couty should be subjected to a similar set of experiments. What are three doctors in such a question?—*Anglo-Brazilian Times.*

The Food of Snails.

Are snails carnivorous? Where can some information as to their food be obtained?—T.

VENTRILOQUISM IN BIRDS.

BY R. STANDEN.

THAT many birds have the power of producing effects similar or analogous to those produced by human ventriloquists, I think no one will doubt who has paid close attention to their habits. I have often been deeply interested in listening to the notes of some songster concealed in a densely foliaged tree, or thick bush, to observe how the sound seemed to come sometimes from the centre, sometimes from the extreme right or left, from the topmost twig, or apparently from the ground, and all the while, the bird has never moved from the position it first occupied. During last spring, I came across several notable examples of this curious power. One evening, I had been listening for some time to a landrail, in a meadow near the house, and as I leaned over the gate, I noticed that although the bird never ceased its energetic "Crake crake," the sound continually varied as if it were constantly in motion. Sometimes it sounded so near, that the harsh rasping notes grated upon my ears in a positively painful manner, then it would seem to recede, and come more faintly from the other side of the meadow, now from one corner, and then from the other, and suddenly would be heard again, in what I calculated was its original position—a thick tuft of grass about ten yards away. I was pretty sure only one pair of birds were in the meadow, and yet there seemed to be either five or six individuals, or else the same bird was rapidly traversing the meadow, to and fro, uttering its note all the time. I determined to solve the mystery, so very quietly and cautiously climbed a small alder tree close at hand, and fortunately succeeded in getting aloft without alarming the bird, or interrupting its note. I was gratified to see plainly, from my elevated perch, the head and neck of the landrail, showing above the grass in the same tuft where I had at first judged it to be

esconced. It was scraping away most vigorously, and although it never stirred away from the spot, the sounds still flitted about the meadow in the most will-o'-the-wisp-like manner, and I proved to my own satisfaction, during the time I remained up the tree, that the bird was really an accomplished ventriloquist.

Another bird, gifted with this power in a high degree, is the grasshopper warbler. Any one who will stand for a while, and listen attentively to its peculiar stridulous song, will notice that the sound varies and seems to shift from one place to another in a startling manner. The bird may perhaps only be four or five yards away from you, and yet its notes will now seem close to you, and then suddenly they will appear to come from some bush to the right, or left, fifty or a hundred yards away. Indeed, the ear will often be so deceived, that it becomes a matter of real difficulty to fix upon the precise spot where the bird is located, and it is so shy and retiring in its habits, that, when alarmed, its song ceases, and it glides away through the bushes silently and stealthily, and once disturbed is some time before it re-commences its amorous ditty. I have little doubt that it uses this power to mislead intruders as to its whereabouts, and thus secure its safety. I have several times noticed the ring ousel employ ventriloquism to entice me away from the vicinity of its young, throwing its voice in different directions, evidently with the intention to lure me away from its nest. The starling is another bird in which I have noticed this remarkable faculty; and also the hedge sparrow, and sedge warbler; the latter, as is well known, possessing wonderful mimetic as well as ventriloquial powers. But perhaps the most gifted bird I have met with is the moor-hen. I have often been attracted by its peculiar croaking cry when returning homewards on a fine summer evening, and several times have tried to follow, and trace it out. Sometimes I have failed, and other times when my perseverance has been rewarded, I have been astonished to find how my ears have been deceived, for I am naturally very quick in the perception of sounds. I have been fully convinced that the bird was in a certain spot twenty or thirty yards away, but on going to the place, it has still sounded that distance ahead; on going forward it has seemed as far to the right, then again straight on, or to the left; as I moved, so would the tantalizing sounds, and perhaps, after dodging about for half an hour or so, I should most likely finally succeed in tracking them to some pond, two or three hundred yards away from where I first started, and there I should find the bird leisurely moving about, quite unconscious that its unmusical croak had made it such an object of interest to me, and I am certain it had never been away from the pond during the time I was looking for it.

I am fully convinced, from my own experience, that certain birds use this ventriloquial power for the purpose of misleading their enemies. Others, again, would appear to use it only for their own amusement, and in some cases it would appear to be involuntary—one particular individual having the power more highly developed than its fellows. It may in some cases form a particular kind of bird language, for I believe, that not only do many birds utter sounds which are imperceptible to our organs of hearing; but that the sounds they sometimes utter may be deceptive to us, from the fact that the human ear requires a certain amount of experimental education, before it can exactly decide as to the precise position from which new and unfamiliar sounds may proceed.

I should like to have the opinions of ornithologists on this subject, for it is an interesting point to me, and I feel sure it must be equally so to any one who has met with instances similar to the few I have mentioned.

Coal Gas.

When was the peculiar property of coal gas first turned to practical account?—W.

JOHN WILLIAM DRAPER.

PROFESSOR DRAPER'S death, on the fourth of January, 1882, was felt to be a great loss to science and to literature alike in the old and in the new world. The following outline of his distinguished career appeared immediately after his death in the *Manchester Guardian*.

Although by far the greater part of his long and honourable life was spent in another hemisphere, Dr. Draper was a distinguished Lancashire man, and was eminent not less in literature than in science. He was born on the 5th of May, 1811, in the town of St. Helens. In his early private studies his special bent appeared to be chemistry, physics, and the higher mathematics. His devotion to experimental science was largely due to the curiosity excited by seeing, when young, a glass containing some camphor, portions of which had been caused to condense in very beautiful chrystals on the illuminated side. This spectacle led him to read all that he could find on the influences of light, adhesion, and capillary attraction. He proceeded with his chemical studies at the University of London, then only recently established. He did not take a degree there, probably owing to his decision to emigrate to the United States, where he went in 1833. Three years later he graduated M.D. in the University of Pennsylvania, which has always had a high reputation as one of the best teaching bodies in the Republic. His ability attracted notice, and he was invited to become Professor of Chemistry, Natural Philosophy and Physiology in Hampden-Sidney College, in Virginia. This position he exchanged in 1839 for that of Professor of Chemistry and Natural History in the University of New York. Two years later he took the chair of Chemistry in the University Medical College, and in 1850 undertook also the duties of Professor of Chemistry. Subsequently he became President of the Medical and Scientific Departments. He retired from active duty in 1868. Dr. Draper's scientific industry is attested by a lengthy series of memoirs contributed to various journals and learned societies. His graduation thesis was selected for publication by the medical faculty, and this was but a happy augury of the many important papers which followed that essay. Between 1834 and 1874 not less than fifty memoirs were published from his pen, whilst others still remained in MSS. Those relating to radiant energy were collected into a volume in 1878, and show how greatly his researches had contributed to the increase of knowledge in that important domain of physics. These are further testified by the award to him in 1876 of the Rumford Medal of the American Academy of Sciences. The Hon. C. F. Adams, in presenting the medal, referred to Dr. Draper's discovery in 1840 "of the peculiar phenomena commonly known as Moser's images"; to his method of measuring the intensity of chemical light, which was afterwards perfected by Bunsen and Roscoe; and to his investigation of the temperature at which bodies become red hot, the nature of the light they emit at different degrees, and the connection between their condition as to vibration and heat. He showed that ignited solids yield a spectrum that is continuous, not interrupted. This was 13 years before Fraunhofer had published his memoir on the subject. Mr. Adams went on to refer to Dr. Draper's claim to be the first to have applied the daguerrotype to the art of portraiture; to his application of ruled glasses and specula to produce spectra for the study of the chemical action of light; to his researches on the nature of the rays absorbed in the growth of plants in the sunlight; to his discussion of the chemical action of light, and to his researches on the distribution of heat in the spectrum. He was not only the first to take a portrait by the photographic process of Daguerre, but the first who succeeded in obtaining a photograph of the moon. The list of investigations em-

bodied in the award might well suffice to account for the activity of forty arduous years, but in point of fact they represent only a small portion of Dr. Draper's claims to remembrance. His work "On the forces that produce the organization of Plants" appeared in 1844, his "Text-book of Chemistry" in 1846, and his college lectures were embodied in a work on "Human Physiology," which was very favourably received in 1856, and went through several editions. The last-named is not merely a text-book, but contains the result of fresh and original investigations. Dr. Draper had wider conceptions of the domain of physiology than those which usually obtain, and at the close of his treatise he entered upon a brief examination of what he termed "social mechanics." Naturally enough he found the subject too large to be thus satisfactorily treated. A wider survey and fuller examination of it resulted in the production of the work by which he will, perhaps, best be known in the future—"The Intellectual Development of Europe." An abstract of the physiological argument contained in this work was read by the author at the Oxford meeting of the British Association in 1860. The importance of the book was at once recognised by those best competent to judge. The demand for it led to a new and revised edition, and various translations attested the value that was set upon it abroad. It is a curious and interesting circumstance that the portion of it relating to Mahometan science was translated into Arabic. Soon after the publication of this great work its author was requested to lecture before the Historical Society of New York. He applied the same method which had proved successful in dealing with European questions to the political problems of his adopted country. On their publication these "Thoughts on the Civil Policy of America" were warmly received, and ultimately led him to undertake the "History of the American Civil War," which had just then closed. For this task he had special qualifications. Many of the leading actors in those stormy scenes were his own personal friends. The Secretary for War gave him access to the public documents on both sides, and military men and civilians alike were glad to afford information to one who stood so high in the public estimation. Dr. Draper published an English edition of this work in 1871.

His last work of importance is that which has had the greatest share of popularity. The "History of the Conflict between Religion and Science" was written in 1873, and issued in the "International Scientific Series." It speedily attained a wide popularity and acceptance. Many editions have appeared in England and America, and it has been translated into French, German, Spanish, Russian, Italian, Polish, Servian, and other languages.

Notwithstanding the apparent dissimilarity of the subjects of his works, a certain sequence about them is perceptible. He himself felt this. "When I look back," he says "on the objects that have occupied my attention, I recognise how they have been interconnected, each preparing the way for its successor. Is it not true that for every person the course of life is along the path of least resistance, and that in this the movement of humanity is like the movement of material bodies?" Dr. Draper brought to bear upon all he undertook powers of keen and trained observation, animated by a truly philosophical spirit. He added lucidity and dignity to his exposition of the high themes which occupied his attention. The sincerity apparent in all he wrote was the fitting expression of a life whose many years were devoted to the sober and patient search for truth.

The Vitality of Seeds.

What are the facts as to the vitality of seeds? What credible evidence is there of the prolonged retention of the power of germination. What is the oldest age at which a seed is positively known to have fructified?

O. O.

ON THE VITALITY OF FROGS AND TOADS:

A CURIOUS CHAPTER IN NATURAL HISTORY.

BY W. P. LIVINGSTONE.

IN the October number of the *Field Naturalist* the following query was put by Mr. S. Greenhalgh:—"How long can a frog live underneath a stone or piece of rock?" Such a question seems not unlikely to give rise to an interesting discussion on the vitality of that curious animal (*Rana temporaria*) and its no less curious cousin, the toad (*Bufo vulgaris*), in view of which it may not be amiss to give a succinct account of the former and present beliefs of scientific men and others on this subject.

In the early part of the eighteenth century the attention of the *savans* composing the French Academy of Sciences was called to two cases of alleged discoveries of live toads in the substances of two different species of trees. The first case was reported in 1719 by M. Hubert, a professor of philosophy at Caen, and printed in the academy's transactions. In that report he states that a toad was discovered, alive and well, in the very heart of a "firm and sound" elm of more than the average thickness. The other case was that of a toad being found alive in the centre of a stout and massive oak, and was laid before the academy in 1731 by M. Leigne. From the general appearance of the tree at the time he inferred that the luckless animal must have been a prisoner for a period of about eighty or a hundred years.

These and other similar discoveries seem to have raised a strong degree of interest in the subject, not only in France but also in England, where we find the matter quickly taken up by naturalists, and instances being brought forward of fresh discoveries. Foresters and woodmen declared that in the pursuit of their avocation they frequently found live toads and frogs encased in the wood of various trees; it was, they said, an every-day occurrence to come across one of these cells with their strange, solitary prisoner.

But as if the finding of these animals in trees was not wonderful enough, we next hear of cases when they were actually said to be discovered embedded in the solid rock. We give two or three of these as examples.

A writer in an early number of the *Magazine of Natural History* declared that he had in his possession a toad, preserved in spirit of turpentine, which was taken from a "cavity in the solid rock upwards of 200 feet deep, the space was quite sufficient to contain the body of the animal; and the gentlemen who presented the specimen to me saw it alive forty-eight hours after its detachment from the rock." Another live toad was liberated from a "piece of shale" in the Pendarran Works, Glamorganshire, in February, 1845. It is said that Ambrose Paré saw a piece of rock split up by the workmen and a live toad jump out. Again, at the commencement of the present century one was found in the limestone of Carriber Quarry, in Linlithgowshire, which was said to be the possessor of six "toes."

Numerous other accounts to the same effect might be cited, but the selection we have given will no doubt be sufficient.

The effect of these reputed discoveries upon the credulous public was what might have been expected. The poor animals were regarded with looks of deep curiosity and awe, and for a short period in its family history, the animal that now goes under the well-merited name of the "Martyr of Science," exacted the reverence of both the learned and unlearned; and when the principles of geology began to be taught and understood it was firmly believed that the animals had been entombed alive for millions of years in the heart of the solid impenetrable rock.

Scientific men, however, who thought and observed, soon began to doubt the authenticity of the recorded cases, and some began to make experiments. One of these searchers

after truth was Dr. Buckland, and it is to him that we are indebted for a set of conclusive experiments on the subject. In the month of November, 1825, he placed twelve live toads in as many prepared cells cut in a large block of coarse oolitic limestone, and also twelve other toads in twelve prepared cells cut in another block of compact siliceous sandstone, special precautions being taken, of course, to render the cells impervious to air and water. These blocks of stones, with their living contents, were then buried in the doctor's garden three feet beneath the surface, and remained there untouched until the month of December, 1826. On the 10th day of that month they were examined, and it was found that all the toads in the compact sandstone were dead, and their bodies much decayed, but most of those in the larger cells of the soft limestone were still alive, some being even fatter and plumper than when first immured. It was thought, however, that these owed their lengthened existence to the insects which had certainly penetrated to the cells, and also to water that had probably filtered through the stone. These survivors were again buried, and at the expiration of another year were all discovered to be dead. At the same time that the above experiments were begun four other middle-sized toads were placed in cavities hollowed out in the trunk of an apple tree, and these being firmly plugged up so as to exclude insects, were allowed to remain for a year, at the end of which every one was found, on examination, to be dead.

Thus it was proved that not one toad out of twenty-eight could survive for a period of two years when deprived of air and food. Those readers who wish to go into the matter more fully would do well to read Dr. Buckland's masterly paper, which was contributed to the *Edinburgh New Philosophical Journal*, April, 1832.

But all naturalists did not accept Dr. Buckland's experiments as satisfactory; many declared them to be essentially faulty. A writer in an early number of *Chambers' Edinburgh Journal*, discoursing on the Hibernation of Animals, gives us his opinion upon this subject, and accuses the doctor of showing a surprising want of ingenuity in the manipulation of his experiments. The same writer was firmly convinced of the immense antiquity of these poor amphibians, and he grows eloquent when he sees before him "living animals whose age is to be numbered by millions of years, which have survived the age of ichthyosaurs and pterodactyles, and to which the birth of the mammalian tribes was but as a passing event in the midst of a mighty series."

At the present day instances of frogs and toads being found alive in cavities in the rocks are numerous, and are always cropping up in the newspapers. These, however, in the absence of proper proofs and scientific accuracy, cannot be much relied upon; they are generally read with a sceptical eye by the naturalist and geologist. Still, there exists among the lower and less-educated classes of the country a strong belief in the authenticity of these reported occurrences. Here and there, among the more intelligent class, we may also find one who shares the common belief, but such cases, we believe, are rare. A friend of mine—an accomplished ornithologist, though no geologist—solemnly avers that a toad was recently discovered in the interior of a boulder composed of basalt, and also that he believed it got in there when the stone was being formed! He was apparently unaware of the fact that at that time it was a fiery liquid mass of lava. Poor toad!

(To be continued.)

Eyesight and Study.

From time to time the public papers have contained warning statements as to the injurious effect of the present school system on the eyesight of the young. Are there any good grounds for alarm? M.

THE SUPPOSED HUMAN FOOTPRINTS IN NEVADA.*

BY PROFESSOR O. C. MARSH.

DURING last season, much was written in the Western newspapers on discoveries of traces of supposed human footprints near Carson, Nev. General attention of scientists throughout the country was attracted by the publication of scientific investigations then made, and the dissemination of the best available opinion thereon. Professor Cormick found the tracks numerous. They looked as though the foot was clad in sandals. All the footprints discovered were turned in the direction of a rocky wall, where they abruptly terminated. As far as parts of this wall were removed, the tracks were found to continue. The soil in which they were found is that of the pliocene period, in which the remains of horses, elephants and other animals are found, and the theory was formed that man's first appearance on this continent dates from this time. The difficulty in assigning the footprints to prehistoric man is that they are enormously large, being no less than twenty-eight inches in length. But the idea that there were giants in those days is not so absurd as it would first appear to the popular mind. A more serious difficulty remaining to be explained is the distance between the tracks, not in the direction of progression, but from left to right; and I therefore more incline to the belief that they were made by a gigantic sloth, which I have designated the Morotherium. The fact of these footprints curving outward is strongly evident of their having been impressed by the giant sloth, corresponding as they do with the foot-formation of that animal. Yet, against this theory it must be admitted that no bones of this fossil sloth have been found in the neighbourhood, and that I am more inclined to attribute them to a giant sloth I am bound to admit that with the meagre data at present available, the question is simply a speculative one, nothing being decided. The remains of giant sloths have been found in California with bones of horses and elephants. But from excellent drawings sent to me by Professor Le Conte, a gentleman at present engaged in searching for bones of the sloth, I have been unable to decide whether the tracks can be assigned to the Morotherium proper or to a distant species not yet determined.

* Abstract of a paper read to the American Academy of Science, 18th Nov., 1882.

HEARING IN BEES.*

BY SIR JOHN LUBBOCK, BART., M.P., F.R.S.

SOME bees were trained to come to honey which was placed on a musical box on the lawn close to a window. The musical box was kept going for several hours a day for a fortnight. It was then brought into the house and placed out of sight, but at the open window, and only about seven yards from where it had been before. The bees, however, did not find the honey, though when it was once shown them they came to it readily enough. Other experiments with a microphone were without results. Bees are popularly, and have been ever since the time of Aristotle, supposed to be influenced by clanging kettles, &c. Experienced apiarists are now disposed to doubt whether the noise has really any effect, but it is possible that the bees hear only the higher overtones at the verge of, or beyond the range of human hearing. A bee and a wasp, for each of which a store of honey was provided, were timed, and it was found that the wasp began earlier in the morning (at 4 A.M.) and worked on late in the day (till 8 P.M.) It may be that the wasps are less sensitive to cold. Moreover, though the bee's proboscis is admirably adapted to extract honey from tubular flowers, the wasp on the other hand appears able to swallow it more rapidly.

* Extracted from the tenth communication on the "Habits of Bees and Wasps," read before the Linnæan Society, Nov. 2, 1882.

THE METAMORPHOSIS OF PENAEUS.

BY W. K. BROOKS.

SCARCELY another fact in morphological science, standing alone, exceeds in interest the discovery that Penaeus, a Decapod, passes through a Nauplius stage.

Those familiar with the literature of the subject will recollect that Fritz Müller kept under observation until it changed into a Protozoea, a Nauplius which he captured at the surface of the ocean.

He also secured, in the ocean, a very complete series of larvae, through which he identified his Protozoea with a young Macrouran with the characteristics of the genus Penaeus.

He did not rear the Nauplius from a Penaeus egg; nor did he actually observe the transformation into the young Penaeus. Certain over-cautious naturalists have therefore refused to accept his conclusions until more conclusive proof should be furnished.

A number of stages in the development of Penaeus have been figured and described by Clous, but as he also relied upon surface collecting his evidence is open to the same objection.

Although I have shown, by tracing from end to end the life history of Lucifer, that this Macrouran undergoes a series of changes almost perfectly parallel to those which Fr. Müller describes in Penaeus, it is still desirable, as a matter of history, and in order to set at rest those critics who refuse to give any weight to deductive reasoning in Morphology, to trace the life-history of Penaeus, by actually witnessing the changes.

I have been able this summer, at the marine laboratory of the Johns Hopkins University, to obtain the youngest Protozoea stage of Penaeus; the stage which Fr. Müller actually reared from the Nauplius. I have had the good fortune to rear this larvae in the house, and to witness in isolated captive specimens every one of the five moults between the first Protozoea and the young Penaeus. During June and July, the breeding season, the mature females cannot be found inside the sounds of our coast, and as our boat is too small for outside work during these windy months, I have not been able to secure the eggs or Nauplii; but this, the only gap in my series, is filled by Fr. Müller's observation. The whole metamorphosis of Penaeus has therefore been actually witnessed, and there is no longer any room for criticism.

Protozoeas apparently identical with the youngest one figured by Müller, and which a comparison with Lucifer shows to be in the "First Protozoea" stage, were captured at the surface of the inlet, by the hand net.

They were carefully drawn and measured, and were then placed in tumblers, one in each tumbler, and were kept thus isolated and under observation until they assumed the characteristics of the genus Penaeus, which they did after five moults.

The first Protozoea has an ocellus, a very short rostrum, and traces of the compound eyes, which are not yet moveable. The first and second antennae are Nauplius-like, and the biramous second antennae are the chief organs of locomotion. The labrum has a short spine: the mandibles are stout-cutting blades, with no trace of a palpus, or of the swimming branches of the appendage. The first maxilla is small and jaw-like, while the second is long and slender, with a very small scaphognathite. There are three pairs of Maxillipeds, all of them biramous. The first pair are large, fringed with long swimming hairs, and they are efficient swimming organs. The second pair are much smaller, and of less functional importance, and the third pair are rudimentary, and scarcely visible. The long slender hind body shows only very faint traces of a division into segments, and no ganglia could be made out. The tip of the abdomen forms a forked telson, with seven pairs of plumose hairs; one short one on

the inside edge; another short one on the outside edge; and a terminal row of five much longer ones, the middle one being the longest of all.

After moulting, the "Second Protozoea" is essentially like the first, the chief differences being that the compound eyes are now movable, and the hind body is sharply divided into segments. No joint as yet separates the telson from the sixth abdominal segment, but, with this exception, all the segments of the hind body are now well defined.

In the species which was studied, probably Penaeus Braziliensis, the rudimentary thoracic and abdominal appendages, described by Claus at this stage, were not visible. I did, however, find a few specimens of another species, which agreed, in this respect, with Claus's figure.

After the next moult the larva becomes, what I have called in my paper on Lucifer, a "Protozoea with preparations for the Schizopod Stage."

It might, perhaps, be spoken of as a Zoea. The ocellus is still present, although the compound eyes are large and quite movable.

The rostrum is lengthened. The two pairs of antennae retain the Nauplius characteristics.

The mandible has no trace of a palpus, and the Metastoma consists of a pair of broad, flat plates, separated from each other on the middle line, and placed in the same series with the other appendages.

The maxillae and maxillipeds are as they were at the stage before, except that the third pair of maxillipeds are a little larger, although they are still rudimentary.

The five thoracic somites are now cemented together, and each bears a pair of buds or pouches, the rudimentary appendages.

The telson is separated by a joint from the sixth abdominal segment, and the latter carries a pair of rudimentary swimmerets. There are no trace of appendages on any of the other abdominal segments, although all the ganglia are conspicuous and well developed. The halves of the fork of the telson diverge from each other a little more than they did during the earlier Protozoean stages.

After the next moult the animal reaches the Schizopod stage, so far as the anterior half of the body is concerned, although the abdominal appendages are still absent. The ocellus is still present, as in the first Protozoea, but the character of the antennae has changed completely. The ear has appeared in the basal joint of the first antennae, and contains diatoms and other foreign bodies. The two-jointed basal portion of the second antennae carries a short pouch, the rudimentary flagellum, and a long scale, with plumose hairs and a single spine.

The palpus has appeared on the mandible. The exopodites of all five pairs of legs are large, and are now, with the swimmerets, the locomotor organs. The endopodites of the fourth and fifth pairs are now somewhat less developed than those of the first, second, and third pairs, which now end in chelae. The abdomen carries only one pair of appendages, those of the sixth segment, but these are now larger, and are used in swimming.

The tip of the telson is now almost square, with a very slight notch in the middle line.

After the next moult the chief change consists in the formation of the first five pairs of abdominal appendages. The endopodites are absent, and the whole appendage is rudimentary, and is not used for locomotion until the next stage.

After the next moult the animal reaches the Penaeus' stage. The scale of the antennae becomes broad and triangular, the flagellum is greatly elongated, and is divided into twelve joints. The mandibular palpus is greatly enlarged, and covers up the bases of the antennae. The exopodites disappear from all five pairs of legs, and the abdominal appendages are now functional, although the endopodites are still absent.

This stage is reached by the first Protozoea in about three weeks, and all the changes have

been actually witnessed in isolated captive specimens.

Our boat is too small for work outside during the windy months of June and July, and as the ripe females do not come into the inlets and sounds, I have not been able to obtain the eggs or the newly hatched young; but this is the less important as Fr. Müller reared his "First Protozoea" from a Nauplius, so that we now have the entire metamorphosis from actual observation.—(*Circular of the Johns Hopkins University.*)

ORIGIN OF BIRD NAMES.

MR. H. T. WHARTON, in a paper which appears in the *Zoologist*, opens out a field of research that is at once novel and attractive. Naturalists and philologists may unite their forces in an attempt to determine the meaning and origin of the names commonly applied to English birds. As Mr. Wharton points out, some of these names are imitations of the notes of the bird, and are not always very successful imitations. Others again are allusive to colour or appearance, whilst a still greater number refer to peculiar habits, although some of these have been so greatly modified as to be unintelligible except when the clue is sought in the history of the word. The "Peewit," which the French call *Dixhuit*, the "Kittiwake," the "Pipit," may be cited as attempts to indicate the notes of the birds to which they are applied. Professor Skeat thinks that the old High German "Hiegro" was adopted as the name of the "heron," by way of allusion to its harsh voice. From this word have come the French "Aigre" and "Aigrette," of which our own "Egret" is another form. From the root of "Hiegro" also come the Low Latin "Aigro" and "Airo," the French "Héron," which we have also adopted. The French "Héronceau" has become with us the "Heronshaw." The same word, with the entirely different meaning of a heronry, is a compound of "Heron" and "Shaw"—that is, a wood. The pretty or peculiar appearance of birds has given rise to such names as "Blackbird," "Bluethroat," "Razorbill," and "Yellowshank." The name of the "Oriole" is derived from the Latin "Aureolus," and means the golden bird. Many of these names have become obscured by the process of time and the changes in the language which it has brought about. Thus "Avocet," "Bustard," and "Ostrich" are all believed to be compounds of the Latin *avis*, although they have departed widely from the original forms of "*avis casta*," "*avis tarda*," and "*avis struthio*." "Godwit" is a corruption of good wight, whilst "Goatsucker" indicates a former belief as to the habits of the birds. The names of men and women have in many instances been applied to birds. Thus we have "Will-ock," "Guillemot," and "Magpie." The name of "Petrel" is an allusion to St. Peter on the waves. The name of "Mother Carey's Chicken," by which it is known to sailors, is said to be a corruption of the Portuguese "Madre cara." It is notable that the French call the petrels "oiseaux de Notre Dame." Some bird-names we have inherited from Greece and Rome. "Kestrel" has been traced back by Professor Skeat to "qurquedula," the Latin name for the Teal. The intermediate stages of this transition are the old French forms of "quercelle," "quercerelle," which in English became "Kerc'relle," and so was easily corrupted to "Kestrel." Many instances might be cited, but those already adduced will show that Mr. Wharton has pointed the way to a fertile and little worked field of investigation. When the English Dialect Society have completed their collection of provincial bird-names, there will be still ampler materials for comparison and research. The birds need no adventitious recommendation, and yet with many it must add to the interest with which they are regarded when we have the clue to the meaning of the

names by which they are associated with the poetry or the superstition of bygone centuries. —*Manchester Guardian.*

ON THE GROWTH OF THE MOLLUSCAN SHELL.

BY H. L. OSBORN.

THE structure of the molluscan shell has been studied by means of sections of adult shells by Carpenter and others, and they have found that it presents an outer membranous horny epidermis and an internal stony portion. Such a method could not give any idea of the actual process of shell formation, and a knowledge of this could be gained only by study of the first steps. To this end, edges of the shell were snipped away and a thin glass circle thrust between the animal and its shell, care being taken to prevent injury to the mantle. After the lapse of twenty-four hours the shell was opened and the glass circle carefully examined, others were allowed to remain two days, three days, or for periods of weeks.

In twenty-four hours it was found that a film had been left upon the circle; in forty-eight hours, this film was plainly stony. The earliest traces of this film, when treated with coloring reagents, stain, but, when treated with acids, show no traces of lime, nor any evidences of structure; it is simply a structureless membrane. Later films, when treated with acetic acid, present the appearance of a tesselated pavement, and when examined with the polariscope and not treated with acetic acid show beautifully the presence of lime.

It would thus appear that the epithelium of the mantle pours out a secretion of horny matter which forms the epidermis; that this secretion holds lime in solution; and that from this the stony internal portion of the shell is formed. Experiments were successfully made upon the shells of the oyster and *Pinna* and several other lamellibranchs, and some gasteropods were tried, but thus far in vain.—(*Circular of Johns Hopkins University.*)

LLEWELLYN AND GELERT.

BY R. ANGUS SMITH, PH.D., LL.D., F.R.S.

I HAVE read Mr. Axon's remarks on the story of Gelert (see No. 7 *Field Naturalist.*) It was very interesting to me when many years ago I saw a similar event mentioned in the Hitopadesa, and I have observed the general course of opinion regarding the ancestry of tales, and especially of Aryan folk-lore. I am by no means disposed to allow that the killing of a man or a beast, for the reason given in ancient times, is a proof that there was no such killing in modern or less ancient times, or that the protection of a child by a dog was not Welsh because it formerly happened in India. Dogs are protecting children all day everywhere, or in most countries. The protection is from all kinds of danger, from human enemies, or from wolves down to rats, and how much farther I do not know. Clearly this part of the story did not require to be brought from India. The Welsh dog killed the wolf and was blamed for killing the child. Dogs cannot speak. They are often blamed for the faults of men. Have we not known them blamed for stealing poultry, eggs, and sheep, when men were the real culprits? Men are hasty in anger, and have we not ourselves, as a nation, been guilty of sentencing to death many, or at least several, men confessedly afterwards found innocent. A notable case occurred lately at Manchester; another struck us all as an incident, I believe, from Macclesfield. But are we not continually blaming the innocent, and because the guilty are so cunning? Is there any one who was never at school punished for the guilty? Is it not the commonest of human errors to miss the offender in the search, and is it not become a household proverb that the cat bears the blame and with it the punishment. I look on it as a consequence of a mental frailty in man as in animals. Our history is full of blunders in which the innocent are made to suffer for the

guilty. The Jews have been for many centuries a standing specimen of this, and at this day suffer for the murder of Christian children which they are supposed to decoy, whilst they are as innocent as Llewellyn's dog.

Again let us look at the frightful history of witchcraft, where we find it as common as possible to make a Gelert of an old woman and kill her for murdering a child or a cow, a man or a woman, or a field of grain. It is, as we look back upon it, almost a rule for human beings to hit first on the wrong person as their enemy, and men will threaten Forster and Gladstone as the cause of Ireland's woes, and commit murder without thinking over the truth of their fears. We may view it thus. Haste is the original habit of doing what is called justice, and history is full of repentance caused by it. Even now, we must often repent after all the long, cumbrous, but not too careful forms of modern English trials. Nothing can be too careful in criminal cases. Gelert is a typical sufferer, a human heart has sorrowed for it. In India some other domestic animal (a weasel is named in the translation) suffered instead of the dog. Weasels are supposed to have been more petted before cats. But the Welsh story is more like the truth.

My argument is that the story being a natural result of the hasty judgment of man happens daily in spirit, and in old times, when wild animals were common, it may have happened millions of times. The dog is a natural protection of a house, and in the country it would most naturally be a principal actor.

The spirit being the same, the agents may differ in every country, but in every country we may be certain that animals—and especially dogs—have been killed in the rage of their masters, while they have been innocent enough, and in our island wolves have been the enemies of men and children, as we well know, while dogs have been their constant friends.

There may be some stories not so connected with a common habit of man and animals as this is, and which lead as to look to remote ancestors, but I know of no innate objection to the story of Gelert, and cannot agree to the pre-historic argument, believing as I do that men and animals are continually repeating their acts, as similar organs play similar tunes.

UNUSUAL SITUATION FOR A BEES' COMB.

BY W. B. ELLIS.

A GENTLEMAN here, whilst out shooting, had his attention drawn to it by a pheasant falling close by, and on picking up the bird he saw the comb, so sent his man next day to fetch it, and has since kindly given it to me.

It is perfectly empty, and seems to me not to have been used this year. The comb was so worked in among the stuff that the man broke it considerably when cutting it out, but I send you a little sketch of what it is now, with some of the detached pieces, if you had room to put it in your magazine. I should be glad to hear if any of your readers have ever found a similar one.

Arundel.

SONNET TO THE ROBIN.

BY GEORGE MARKHAM TWEDDELL,
Author of "The Bards and Authors of Cleveland and South Durham."

Hail to thee, Robin! how I love thy song!
Cheerful it rings upon the morning air,
Reminding us of all things good and fair,
And not of those to misery that belong.
Like thine, our poet's ditties ne'er among
The tools of tyranny should bear a part,
But help to bravely nerve each human heart
To do its duty nobly. Every song,
Like thine, dear Redbreast! should be free from guile;
Not merely songs in sunshine, but in gloom,
Like thine they should be heard: when sorrows loom
Above and all around us, they the while
Should cheer us onward in the path of right,
And help to wing our souls to heaven's unfading light.

Rose Cottage, Stokesley.

Our Study Table.

MONOGRAPH OF THE SEAL-ISLANDS OF ALASKA. By *H. W. Elliott.* (Washington, Government Printing Office.)—This monograph is one of vivid interest. The author deals with his subject in a systematic fashion. The islands are described and the natives thereof, and then special attention is given to the seal-life on the Probylov islands. The *Eumetopias stelleri*, and the walrus are described in detail, and the reproduction of the fur-seal, sea-lion and walrus are explained. There are in addition a large number of interesting illustrative notes and many maps and illustrations. The description of the struggle for existence, and the process of natural selection is exceedingly interesting.

KAFFIR FOLK-LORE. By *Geo. McCall Theall.* (W. Swan Sonnenschein.)—The author of this book has had the advantage of working in almost virgin soil, and he has not failed to profit by his opportunities, and the result is a very readable selection of the traditional tales current among the people living on the eastern border of the Cape Colony. Some of them are exceedingly characteristic of savage life, whilst others present those remarkable analogies that continually astonish the student of popular mythology.

LONDON DIALECTAL SOCIETY QUARTERLY JOURNAL. This number contains abstracts or papers on the Devolution and Transfer ef Land, by Sir A. Hobhouse, aud the Opposition of the Channel Tunnel, by Mr. W. C. Coupland.

CATALOGUE OF THE FOSSIL FORAMINAFERA IN THE BRITISH MUSEUM (NATURAL HISTORY). (London, Printed by order of the Trustees.) The compiler of this useful catalogue is Prof. T. Rupert Jones, and although it aims at representing the present state of the collection, and not at being a complete monograph of the subject, there is much valuable information as to the classification and distribution of the foraminifera. At the end, for instance, is a note on English and Belgian Nummulites, which was written by the late Dr. Philippe de la Harpe.

HOW TO DETECT THE ADULTERATIONS OF FOOD. (London: T. Fisher Unwin.)—In this age of ineffectual acts to prevent the adulteration of food, this little manual will be of service to those who object to become martyrs to trade.

LINGUISTIC ESSAYS. By *Carl Abel, Ph., Dr.* (London, Trübner & Co.)—Dr. Abel's work is an important contribution to philology. His standpoint is one that is too much overlooked by modern writers on the subject. The attention now paid to phonetics tempts some observers to forget that there is also a psychological side. A word is a meaningless sound until it becomes the garb of a thought, belief or fancy. It is this psychological aspect of language that has attracted Dr. Abel, and he has applied the comparative method with much acuteness in discussing the "conception of love in some ancient and modern languages," the connection between dictionary and grammar and other topics.

PORTFOLIO OF DRAWINGS OF LIVING ORGANISMS. By *Thomas Bolton, F.R.M.S.* (The Author, 15, Newhall Street, Birmingham.)—The excellence of these drawings will, we hope, recommend them to the large and increasing class who are interested in microscopical studies.

FERNS AND FERNERIES. (London: T. Fisher Unwin.)—A useful little book, dealing with the subject in an elementary but interesting fashion.

FRESH WATER AQUARIUM. By *James Weston.* (London: T. Fisher Unwin.)—Aquaria, after being for a time a rage, fell into undeserved neglect, but are now recovering their true position. Those who are anxious to know the methods by which the fresh water, the insect, the microscopical, and the marine aquaria are managed with success will do well to consult Mr. Weston's tractate.

GEOLOGICAL RAMBLES ROUND LONDON. (London: T. Fisher Unwin.)—Those who go upon half-holiday excursions in the neighbourhood of the metropolis may find in this guide some hints by which scientific interest may be added to the sanitary advantages of such holidays.

ROUND BROMLEY AND KESTON. (T. Fisher Unwin.) Another half-holiday guide and one of an interesting district, for it includes Down, which will henceforth be the shrine to which many Darwinian pilgrims will bend their steps.

REPORT ON THE MIGRATION OF BIRDS, 1881. (Swan Sonnenschein & Co.)—The third annual report on migration in no way falls behind its predecessors in point of interest. These careful observations will at no distant period furnish an important body of data from which some reliable conclusion may be safely drawn.

MICROSCOPICAL SECTION-CUTTING. By *Sylvester Marsh.* (London: J. and A. Churchill.)—This is the second edition of Dr. Marsh's useful book. It emphatically realizes its claim to be a practical guide to the preparation and mounting of sections, and gives special prominence to the subject of animal sections.

FAMILIAR LESSONS ON FOOD AND NUTRITION. By *Thomas Twining.* (London: D. Bogue.)—This volume is intended to serve as a handbook for the food department of the Parkes Museum, and also to be used as a text book for popular lectures. The organic components of food are first set forth, and are divided into nitrogenous and non-nitrogenous constituents, supplemented by groups of accessory organic principles. The inorganic components are arranged into ash, salt, and water. The third chapter is devoted to fermentation, preservation of food, wholesome and unwholesome food, adulteration, and culinary processes. The appendices show the constituents of the human body, and give a synopsis of the classification. This analysis will show the wide range and varied interest of the work.

THE NATURAL HISTORY JOURNAL is an excellent and successful attempt to encourage the study of science by schoolboys. It deserves the good wishes of all.

ALBINO WILD FLOWERS OBSERVED DURING 1882.

BY R. STANDEN.

IT has long interested me to observe the occasional variations in the colours of flowers, more especially those which exhibit a change from their normal colour to that of an albino, or pure white, variety. I find that all varieties, whether brought about by natural or artificial means, tend to return to their normal state—appearing only under certain conditions, and disappearing when those conditions no longer prevail. Chemical changes in the composition of the soil may, perhaps, sometimes influence the change of colour; or, probably, it may be induced by some particular meteorological conditions of spring or summer; and in other cases, some difference of light and shade may be considered the cause. Variations would seem to occur most frequently in blue flowers, less commonly in red, and very rarely in yellow ones. It was only during the past year that I began to systematically note and keep a record of all the instances of flower variation that came under my notice, and when I come to look up all my notes, I am surprised to find so many species recorded as showing albino flowers.

I found three white specimens of the pretty *Campanula rotundifolia* (harebell) at the foot of Beacon Fell, and four others near Woodplumpton. On the Fell I also noted pure white varieties of three heaths (*Erica vulgaris*, *Tetralix*, and *Cinerea*), the first two were to be met with pretty frequently, mostly growing in small clumps; but of the latter species I only found a solitary tuft. I gathered seven white flowers of *Jasione montana* in the same locality. A quiet lane running along the base of Beacon Fell presents a splendid sight during the summer months, owing to the quantity and unusual luxuriance of the *Digitalis purpurea* (foxglove), which springs from the roadside "cops," and rears its tall spikes of blossom in great profusion above the fern and whin. I found five specimens with blossoms perfectly white, and they would have formed an ornament to any garden, but very probably would not have flourished if removed from their native *habitat* to a foreign soil. I once tried the experiment of carefully transplanting two albino specimens into the garden, taking along with them a goodly portion of soil. They grew well, 'tis true, but the year following the flowers were pale lilac, and the next came out in their ordinary colour. Albinos are not unfrequent amongst the thistles, and I have noticed a considerable number both in the *Carduus arvensis* and *Carduus nutans*. In Goosnargh Mill Lane I found two roots of *Primula vulgaris* (primrose), all the flowers of which were pure white; and in a meadow at Cottam I gathered three spikes of *Primula veris* (cowslip) with white blossoms. These are the only instances of my meeting with these two species, showing the albino variety, in a wild state; but I have seen the variety produced by cultivation in gardens. By the brookside, near the mill, I found three white flower-spikes of *Petasites vulgaris* (butterbur), which contrasted greatly with the ordinary flesh-coloured hue of the rest of the flowers growing abundantly around. In the meadow where I gathered the cowslips I observed many white flowers of *Hyacinthus nonscriptus* (wild hyacinth), and very beautiful they were. My sister found two beautiful specimens of *Cardamine pratensis* (mayflower), with double white flowers, in a meadow near Carnforth Hall, and I noticed several others, with ordinary single flowers, quite white. In a shady glade, in Middleton Wood, the *Orchis maculata* grows abundantly, and, in striking contrast to ordinary red blossoms growing near at hand, I noticed two plants with flowers of a pure white hue, and another with very pale pinkish-white blossoms. I have known this station for years, and have often admired the brilliant display made by the orchis, anemone,

primrose, and wild hyacinth, intermingled and carpeting the ground; but this is the first instance of my observing this orchid figuring as an albino. I have met with *Orchis moris* rather commonly as a white variety, especially by the roadside near Whitechapel. I found a number of white specimens of *Vinca minor* (periwinkle), and *Betonica officinalis* (betony) in Middleton Wood; and, near the same place, two specimens each of *Thymus serpyllum* (wild thyme), and *Ajuga reptans* (bugle).

The season must have been very favourable to the growth of the *Solanum dulcamara* (bitter-sweet, or robin-run-i'th'-hedge), for it flowered in great abundance, and its pretty festoons of blueish flowers—so like miniature potatoe-blossoms—hanging over the hedges and ditches, formed a pleasing sight. A luxuriant clump of it, near here, was an object of great interest to me, from a large portion of the flowers being perfectly white, forming a contrast which could be discerned at a considerable distance away, and, what was to me most singular, the berries following these albino flowers were an amber-yellow colour—very noticeable amongst the ordinary bright scarlet fruit around them.

In a field of red clover (*Trifolium pratense*) I observed many white flower-heads, and at first thought they might perhaps be a new species introduced with foreign seed, but the finding of two flowers, one red and the other white, on the same stem, convinced me that these white specimens were true albinos. I noticed a similar occurrence in the tufted vetch (*Vicia cracca*), the same plant bearing both blue and white blossoms. A considerable number of white *Scabiosa succisa* grew in a field near Longridge, and amongst the heaps of rubbish thrown out of the quarries. In the same locality I found three plants of *Scabiosa columbaria*, eight of *Lychnis flos-cuculi* (ragged robin), one of *Polygala vulgaris* (milkwort), and one of *Euphrasia officinalis* (eyebright), all with white flowers. In a meadow near here, I found two white flower heads of that pest to the farmer, *Centaurea nigra* (knapweed), and one solitary plant of *Rhinanthus cristi-galli* (yellow rattle, or pennygrass). Near Whittingham Hall, I found several albino varieties of *mentha aquatica* (watermint), *Erythræa centaurium* (centuary), and a large (number of specimens of *Prunella vulgaris* self-heal). A considerable number of white flowers of *Geranium molle* (bachelor's buttons) were to be seen along the roadsides hereabouts, and on the railway banks at Ainsdale, near Southport, I noticed that white flowers of this species predominated over the red ones. Near Goosnargh Hospital I gathered some fine white forget-me-nots (*Myosotis palustris*), and on the brook-side wall adjoining grew several large clusters of *Geranium robertianum*, with white flowers.

Doubtless many readers of this journal, who take an interest in the subject, could furnish additional examples to those which I have mentioned. I should be pleased to have the opinions of botanists as to the reason of this sporting of flowers from one colour to another, for I am totally at a loss to account for it, or to understand what the conditions really are, which brings about this abnormal change.

Tennyson and the Yew.

If W. B. Cockill will find a male yew (it being a diœcious plant) on a calm day in March, when the pollen is usually ripe, and shake a branch, he will see what Tennyson means by the yew *smoking*.—North Lincolnshire Vicar.

Cheap Literature.

Mr. Elizur Wright, whose address is Box 109, Boston, Mass., offers to send a copy of his book, "Myron Holley, and What He Did for Liberty and True Religion," to any public library, without any other charge than nine cents for postage enclosed in the application.

THE STINKHORN.

(*Phallus impudicus*).

BY R. STANDEN.

PROBABLY there are few persons who have resided for any length of time in the country that have not had, at one time or other, their olfactory organs assailed by a peculiar and indescribably noisome odour, whilst walking during summer or autumn in some quiet rural lane. Many, after getting the first sniff of this horrid stink, are only too glad to hurry on and escape from it, without troubling themselves as to its origin, but those who are wishful to make a closer acquaintance with and know more about the curious object from which it proceeds, may readily satisfy themselves by closely following the scent, and, if they only persevere, they will assuredly discover it. Generally the cause may be found on the "cop" at the opposite side of the fence, and once seen (and smelt) will ever after be remembered. It is one of our most curious and vile-smelling fungi—the Stinkhorn, locally known amongst the country-folk as "devil's dung!" It is well worthy a careful examination, and will be found to consist of three separate parts, easily disengaged from each other. On taking hold of the stem it readily comes away from the volva, or wrapper, which is a hollow, circular, jelly-like bag, of a dirty brownish colour, from which a viscid fluid oozes when the membrane is ruptured. Below, and attached to the bag, is a roundish ball, with a roughened surface like a puff-ball (*Boletris*), white in colour, with a brownish tinge, and from it proceed a few fine stringy rootlets. The pileus, or cap, is shaped something like an extinguisher, and is suspended loosely from the summit of the stem. This cap is entirely covered with a slimy mucilage of a yellowish-black colour, and it is this slimy substance which principally emits the horrible fetid odour. The stem is creamy-white, hollow throughout its entire length, and of a cellular structure. When detached from the volva and pileus it is seen to be curved, and tapers at each end so as to bear some resemblance to a horn. It varies in height, the largest I have seen was fourteen inches high, and two inches in diameter, but from five to eight or ten inches are its usual dimensions. The pileus is generally from one to two and a half inches in length. Strange to say, the slimy mucous covering the pileus, the smell of which is so loathsome to us, is very attractive to many insects, and considered a dainty by them. I found a fine specimen, a while ago, with an ants' nest close to its base, and the busy little creatures were running briskly up and down the stem, the pileus presenting a singular appearance from the number of ants crowded upon it. They covered it completely, pressing one on top of another to get a share of the dainty banquet, which was rapidly disappearing before such an immense crowd of hungry little self-invited guests. In a few days they cleared away every particle of the slimy matter, leaving exposed to view the whitish, deeply honey-combed structure of the pileus, but did not devour any portion of the stem, or volva, so far as I could perceive. In August last I found a specimen near Whittingham Asylum, and was surprised to find the cap completely covered with a dense mass of blue-bottle flies, eagerly devouring the stinking slime. They buzzed away like a swarm of bees when I disturbed them, but some were so gorged they could not fly far away. On standing quietly by for a short time, I soon saw them come trooping back, and alighting upon the cap, which they had very nearly denuded of its slimy coat.

The Stinkhorn is far from common in this locality, but a season rarely passes without my finding from two to half-a-dozen specimens. It generally appears in August or September, but occasionally a solitary specimen may be seen far on into the winter, but such late comers do not seem to possess as highly-developed offensive properties as those

of their brethren who appear during the hot season. There is another species of Stinkhorn, more rarely met with than the common one, called the Lattice Stinkhorn (*Clathrus cancellatus*), but I have never met with it; indeed, I believe it has only been found in a very few localities in England altogether. It is described as possessing a most detestable odour, equal to, if not surpassing, that of the species more familiar to us.

Cunning in Cats.

Cats will sometimes display extraordinary traits of cunning when lying-in-wait for their favourite prey—mice or birds. A cat belonging to a lady residing in one of the suburbs of London used to resort to the following *ruse:* The back garden was separated from the garden of another house by a wall some six feet high. In the neighbouring garden stood a withered tree, scarcely higher than the wall, whose branches were much resorted to by the birds of the vicinity. From the branches of this tree they would hop along the wall, sometimes in considerable numbers. The cat, on first coming into the neighbourhood, would sit for hours at a stretch on the wall, watching an opportunity to pounce on a bird. The birds, however, were too wary, and the cat, finding this out, tried another method. Instead of taking up her station *on* the wall, she suspended herself *from* it, hanging on to the top by her two fore paws, and letting her body drop well out of sight. In this attitude she looked exactly as if she were dead, and had been hung up on some unseen nail. Every now and then she would steathily raise herself until her eyes being on a level with the top of the wall, she was enabled to sweep its surface with a glance and note the approach of any unsuspecting bird. Many a capture bore testimony to the success of this singular *ruse.* One day, however, a bird alighted on the edge of the wall, exactly between the paws of the cat, who, on her side, was in the act of raising herself for one of her stealthy glances. The two were within two inches of each other, and the mutual apparition proved so startling to both that neither stirred for several seconds. Then the paw was lifted, but instead of the usual success attending the movement, the cat lost her balance and fell off the wall, while the bird flew away unharmed!—*Leisure Hour.*

HUMAN SPEECH AS ACQUIRED BY LOWER ANIMALS.

A WRITER in the *Journal of Science* deals with the interesting subject of the attempts of certain of the lower animals to acquire human speech. At the outset the observer is struck by the curious fact that the most successful attempts of this nature have been made not by the animals that are usually held to rank nearest to humanity, but by certain birds. M. A. Roujon tells of a dog that can pronounce the words *ma maman.* Considering the intelligence of dogs, it is perhaps a matter of surprise that such stories are not commoner. It has been suggested that the cause may be in the difference in structure of the vocal organs. At all events, the lower mammalia as a rule do not learn human speech. It is the parrot and not the monkey that learns to talk. This has struck the observant negro, who is said to have a theory that the monkey can speak but will not do so, lest he should be made to work. If the monkeys had arrived at this generalisation they would soon find that even the mutes must do something in the complex organisation of civilised life. It is clear, however, that in addition to the possession of certain physiological and mental characteristics an animal must be in close contact with man before he can be expected to become familiar with his speech. It is evident that the animals that would appear most promising for such an experiment are not available for the purpose. They do not increase in captivity, and hence the hereditary influences of selective development carried on for generations is entirely absent. It is gravely doubted by some whether the birds that imitate the speech of man have any perception whatever of the meaning of the words they use. Do they employ their phrases with definite purpose and intention, or do they merely reproduce what they hear, as a boy may imitate the quack of a duck or the grunt of a pig? The writer of the article mentioned

recites the case of a parrot which always preferred the petition "Give Polly a bit, if you please," when she saw that food was being prepared, but did not offer that observation at any other time. He also mentions a magpie at Stowmarket that knew and used with accuracy the names of several members of the family. The Abbé Gras has two parrots that use general phrases with strict appropriateness. When a supply of seeds is given to Coco she cries "Here is something good." If her companion screams she says "Come, Cocotte, don't scream; sing." If her request is complied with, she patronisingly observes "You sing well; oh, very well!" M. Gras was giving some directions to his housekeeper when Coco interjected. "How, don't you understand?" Intelligent parrots occasionally vary their phrases, and, like children who are learning to talk, never speak of themselves in the first person. The child calls itself "Baby," as the parrot styles itself "Polly." The bird and the child alike puzzle and blunder in conning over a new phrase, and have especial difficulty in mastering the final part of the sentence. Considering what an individual bird can accomplish, it would be rash to limit the possibilities of that which might be if generation after generation of clever parrots were matched. "Perhaps," says the writer, "in these days of "cram and of the equal rights of animals, we "may in five centuries have magpies in the "fifth and sixth standards, macaws preparing "for the examination of the Science and Art "Department, and cockatoos—sweet bird "graduates—taking their degrees at the Uni-"versity of London."—*Manchester Guardian.*

Clever Crows.

I have not said anything about the crows, which are a feature of Yezo, and one which the colonists would willingly dispense with. There are millions of them, and in many places they break the silence of the silent land with a Babel of noisy discords. They are everywhere and have attained a degree of most unpardonable impertinence, mingled with a cunning sagacity which always put them on a level with man in some circumstances. Five of them were so impudent as to alight on two of my horses, and so be ferried across the Yurapugawa. In the inn garden at Mori I saw a dog eating a piece of carrion in the presence of several of these covetous birds. They evidently said a good deal to each other on the subject, and now and then one or two of them tried to pull the meat away from him, which he resented. At last a big strong crow succeeded in tearing off a piece, with which he returned to the pine where the others were congregated, and after much earnest speech they all surrounded the dog, and the leading bird dexterously dropped the small piece of meat within reach of his mouth, when he immediately snapped at it, letting go the big piece unwisely for a second, on which two of the crows flew away with it to the pine, and with much fluttering and hilarity they all ate, or rather gorged it, the deceived dog looking vacant and bewildered for a moment, after which he sat under the tree and barked at them inanely. A gentleman told me that he saw a dog holding a piece of meat in like manner in the presence of three crows, which also vainly tried to tear it from him, and after a consultation they separated, two going as near as they dared to the meat, while the third gave the tail a bite sharp enough to make the dog turn round with a squeal, on which the other villains seized the meat, and the three fed triumphantly upon it on the top of the wall. In many places they are so aggressive as to destroy crops. unless they are protected by netting. They assemble on the sore backs of horses and pick them into holes, and are mischievous in many ways. They are very late in going to roost, and are early astir in the morning, and are so bold that they often came "with many a stately flirt and flutter" into the verandah where I was sitting. I never watched an assemblage of them for any length of time without being convinced that there was a Nestor among them to lead their movements. Along the seashore they are very amusing, for they "take the air" in the evening, seated on sandbanks facing the winn, with their mouths open. They are threatening to devour the settlers, and a crusade is just now being waged against them, but their name is Legion.—*From Miss Bird's "Unbeaten Tracts in Japan."*

THE MICROSCOPICAL STRUCTURE OF ROCKS.

BY GEORGE H. HURST,

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III.—CRYSTALS.

HAVING dealt with the second group of rocks, *i.e.*, those which consist of a ground mass, either alone or containing crystals of various minerals diffused throughout the base, we can turn our attention to those rocks which form our first group, and are built up entirely of crystals, and in connection therewith deal with the crystals which are found in the second group of rocks, the ground mass only of which we have considered. In the present section I shall simply point out the general microscopical properties of crystals of which we take advantage to determine the particular mineral species to which they belong, and hence to determine the mineralogical structure of the rock we are examining. In the next section we shall point out the optical properties of the most important minerals.

To avoid repetition, it must be understood that, except where it is otherwise specified, the descriptions of crystals are as seen when thin slices are viewed under the microscope.

The microscopical properties referred to above, are the form, colour, pleochroism, the effect on polarized light, and crystalline structure.

Form.—It is only when crystals are small that their form can be seen, and advantage taken thereof.

Colour.—This again is a poor test for minerals, more especially in the thin slices used in microscopical study, as, although a mineral may be coloured when seen in hand specimens, yet it frequently appears colourless in thin slices. Some minerals are of such a deep tint that they have a colour even in thin slices, so that we can have an additional property to help us in our determinations.

Pleochroism.—This is the name of the property which many substances possess of showing different colours, according as they are viewed by reflected or transmitted light, or in some crystals according to the particular direction the light passes through it. Some show two colours only,—these are dichroic; others show more than two, and are termed pleochroic. Pleochroism is easily detected in the microscope by sending a ray of polarized light through the crystal, and examining without the analyzer. On rotating the polarizer, pleochroic crystals change colour if strongly pleochroic, o weak, become alternately light and dark. Biotite, hornblende, and tourmaline, minerals found in granite, are examples of pleochroic minerals.

Polarized light is a powerful aid in the determination of crystals. The manner in which crystals act on polarized light depends on their crystalline form. If they are amorphous, or crystallise in the cubic system, they have no action at all on polarized light.

In crystals which belong to either the tetragonal or hexagonal systems, there is one direction, that of the principal crystallographic axis, in which there is no action on a ray of polarized light, but in other directions they have a strong action. In crystals belonging to the other systems there are two directions in which there is no action. These directions of no action are known as the optic axes of crystals.

The general action on polarized light results in the production of colour, sometimes, as in quartz, of great brilliancy; at others, as in mica, only weak. These colours change if either the polarizer, or analyzer, or the section be rotated; the change may be either through a succession of colours, generally in the order in which they appear in the spectrum, as in quartz; or may be only to another colour, complementary to that first seen, as in mica and selenite; in the latter case in one revolution there are four positions in which colour is seen, and four positions where no colour is

seen. The thickness of the section has an influence on the quality of colour yielded.

The *crystalline structure* is also an important factor in the determination of minerals. This structure may be seen with ordinary light, or it may only be developed by polarized light. Taking the first kind of structure, one of the commonest features is the presence of cavities filled with various substances, or inclosures, as they are called. In quartz we meet with these inclosures in great abundance.

The inclosures are either (1) gas, (2) liquid, or (3) solid.

(1) The gas inclosures are usually air and carbonic acid, and are distinguished by their sharp dark outlines, and a determination of their index of refraction, indicates the character of the gas.

(2) Liquid inclosures. These are chiefly water, liquid carbonic acid, and saturated aqueous solutions of salts, especially of sodium chloride. While many cavities are found completely filled with liquid, the majority contain a bubble of gas, distinguished by its spherical form, and its moving if the slide be heated or moved. Sometimes, too, small but perfect crystals of salt are to be seen floating in the liquid.

(3) Solid inclosures. These are of two kinds: 1st, where the inclosure is transparent, and has no action on polarized light, these are termed *glass* inclosures; they are abundant in vitreous, volcanic rocks, are of various shapes, and frequently contain bubbles, but these are fixed, and do not change their position when heat is applied to the section.

2nd. The inclosure is sometimes opaque or crystalline; these are termed *stone* inclosures.

The study of the conditions under which solid inclosures are found in crystals frequently enables us to ascertain the order in which the minerals have crystallized out in a rock.

When crystals are cut across the planes of cleavage, and this property is strongly developed as in mica, these planes appear under the microscope as fine parallel striæ, and in crystals with two or more sets of cleavage planes, there are two or more sets of striæ; by noticing the relative strength of the striæ we can see which of the cleavages is the strongest.

Polarized light brings out many structures which are not visible ordinarily; one of these is the twinning of crystals. This shows itself by each half of the twin crystal being of a different colour, the plane of twinning being sharply marked. In the felspars this is strongly marked, as we shall see presently.

Again, in learcite, a common mineral in many lavas, and a few other minerals, polarized light brings out a peculiar branded structure, which has taught us much concerning their crystalline structure.

When the crystal sections are cut in particular directions, usually across the optic axes, concentric circles or ovals of various colours, accompanied by a black or white (according to the position of the analyzer and polaryzer) cross make their appearance. It so rarely happens in microscopical sections for crystals to be cut so as to show these crosses and bands, that we cannot avail ourselves of this property.

IV.—MINERALS.

The most common minerals which are found building up the great rock masses are quartz, the felspars, the micas, augite, hornblende, olivine, leucite, apatite, garnet, tourmaline, magnetite, and calcite. The optical characters of these we will now proceed to consider:—

Quartz.—When perfectly crystallized the usual form of quartz is that of an hexagonal prism, topped by pyramids. It is very hard and infusible, and practically remains unacted upon by the atmospheric disintegrating agents. Sections of quartz appear clear and pellucid under the microscope, no trace of cleavage can be seen; with polarized light, they yield brilliant colours, which on rotating the polarizer, pass through the series of spectrum

colours; in some crystals of quartz the polarizer has to be rotated to the right hand, to give the colours in the order of the spectrum, in others to the left. Quartz frequently contains inclosures of other substances, often these are visible to the naked eye; but the microscope commonly reveals their presence in vast numbers. Quartz is an essential constituent of granites, sandstones, and it also occurs in small quantities in other rocks.

The *Felspars*.—This important group of minerals are essentially double silicates of aluminum, with potash, soda, lime, with either one or two of these latter bases. Although there are a very large number of felspars known, yet, chemically, they can be divided into three groups, the alkali felspars, the alkali-lime felspars, and the lime felspars. Crystallographically they are divisible into two groups. The potash and baryta felspars, crystallizing in the monoclinic system, the other felspars in the triclinic system; the terms orthoclastic and plagioclastic are respectively applied to these two groups.

Microscopically we can only distinguish orthoclastic and plagioclastic felspars with ease and certainty; it is, however, possible, with care and experience, to distinguish a few of the more important species from each other.

Felspars usually appear in their sections colourless, with here and there opaque spots, where they have undergone decomposition into kaolin. In some rhyolites and lavas the felspar has not undergone any decomposition; this variety is known as *sanidin*. They nearly always exhibit cleavage in two directions; in the orthoclastic felspars, these are at right angles to one another, in the plagioclastic felspars, at various angles.

With polarized light felspars give colours, which, however, are not so brilliant as those of quartz, and only where the felspar remains undecomposed. The twinning of felspars affords us a ready means of distinguishing orthoclastic from plagioclastic felspars, in the former group twinning only occurs once in a crystal, and such crystals show two colours when seen by polarized light; in the latter group twinning occurs more than once, and the sections in polarized light show a number of parallel bands of colour; in the more massive, cleavable varieties of felspar (orthoclase) polarized light brings out another structure, two series of striations at right angles to one another, giving the appearance of a chequered surface. Felspars occur in granites, syenites, nearly all lavas, and in their decomposed form kaolin, are the essential constituent of clays and slates.

Another important group of minerals is the *Micas*. In their chemical composition they resemble the felspars, but differ from them markedly in their crystalline structure, in possessing a very strong cleavage, in virtue of which they can readily be split up into thin lamellæ. The two principal micas are muscovite and biotite.

Muscovite, a potash mica, occurs in rhombic or six-sided tabular crystals; it is transparent and exhibits clear colours under the microscope. It is slightly dichroic, and exhibits striæ, which follow the form of the crystal; inclosures occur very frequently.

Biotite, a magnesian mica, crystallizes in the hexagonal system; in colour it varies from black to dark green; in thin lamellæ, it is brown, greenish, or red by transmitted light. The cleavage is highly perfect. Under the microscope biotite appears of a brownish or brownish-green colour; it has a very strong dichroism; very few other minerals approach it in this property; it gives colours with polarized light, which are not so brilliant as those of muscovite.

The other micas are of little importance. The edges of thin sections of mica always appear more or less frayed, and never have the regular outline characteristic of other minerals. Micas all show colour with polarized light, but on rotating the polarizer, the change is only to the complementary colour to the one first seen. In one complete revo-

lution of the polarizer there are four positions in which colour is seen, two of one colour, two of its complementary, and four intermediate positions where no colour is seen.

Micas occur in granites, in some syenites and diorites, and in many sandstones, to which, if they exist abundantly, they give a tendency to split up into thin flags.

Augite and Hornblende.—These two minerals are very closely allied to one another: their chemical composition is the same, they differ only in their crystalline form and optical properties. Augite crystallizes in six-sided prisms, hornblende in eight-sided prisms. Augite shows one set of cleavage planes, usually has a purplish or brownish tint, and is only feebly dichroic. Hornblende gives two sets of cleavage planes, is usually yellowish green, and is strongly dichroic. Augite and hornblende occur in a very large number of igneous rocks, hornblende being found chiefly in rocks containing a high percentage of silica, where the principal minerals are quartz and ortnoclase felspar, such as granites, a notable example being that found at Syene in Egypt, from which most of the great Egyptian monoliths are constructed. Augite is characteristic of basic rocks, where there is little or no quartz, and the associated felspars belong to the plagioclase group. Augite has a tendency to take up water and pass into another form known as diallage; this altered form can be distinguished from augite by its having a strong cleavage.

Leucite is a mineral which is only found sparsely distributed, chiefly in the lavas of Vesuvius and the Eifel. Sections of leucite usually appear eight-sided, colourless, and transparent; frequently they contain inclosures, generally arranged in a symmetrical manner, in zones following the shape of the section, or in systems radiating from the centre; with polarized light no colour effects are produced, but a number of parallel bands of greyish blue are developed; often there are two or more sets of these bands. Formerly leucite was thought to belong to the cubic system, but the production of these bands have shown that this cannot be the case, and a more careful examination proves that it crystallizes in the tetragonal system, but in forms closely approaching those of the cubical.

Olivine.—This mineral is of frequent occurrence in many of the igneous rocks. It is a green mineral, but in thin sections it appears nearly colourless, and usually has a rough appearance. It is very liable to decomposition, passing into serpentine, which in thin sections of olivine usually appears as lines crossing the section in various directions; it is only feebly dichroic, even in thick sections, and polarizes in brilliant colours. Olivine is interesting as being of frequent occurrence in meteorites.

Apatite crystallizes in hexagonal prisms; it is met with of various colours, colourless, white, red, brown, but usually it is of a pale sea-green colour; the colourless crystals are not dichroic, but the coloured varieties frequently exhibit this phenomenon. The boundaries of apatite sections are always sharply defined; inclosures are of frequent occurrence. Apatite is one of the most widely distributed minerals known, being present in a very large number of rocks.

Garnet.—This mineral crystallizes in the cubic system, therefore it has no action on polarized light; in thin sections it has a pale pink tint and a rough appearance. Garnets most frequently occur in metamorphic rocks, especially in gneiss, tale and chlorite slates and schists.

Tourmaline has usually a blue colour by transmitted light, it is strongly doubly refractive and strongly dichroic; in this it resembles hornblende, from which it can be distinguished by the absence of cleavage planes.

Magnetite is of frequent occurrence in eruptive rocks; it is to be distinguished by its being opaque, and appearing black in thin sections; examined by reflected light it exhibits a metallic lustre.

Calcspar (*Calcite*) crystallizes in the hexagonal system; it is strongly doubly refractive, which can be seen by using the analyzer only. The planes of cleavage which intersect one another are also visible, while by polarized light the numerous granules, which together form the crystalline aggregate, are seen to be composed of numerous lamellæ, which polarize in different colours. This structure is well seen in all crystalline limestones and in statuary marble. Inclosures are frequent in calcspar, both solid and liquid.

Other minerals than these here described are to be detected by the microscope, but as they are not of common occurrence I must refer readers to larger books for a description of their properties.

Distribution of Amphizoa insolens.

At the last meeting of the American Academy of Natural Sciences, Dr. George H. Horn spoke of the geographical distribution of a curious genus of aquatic beetles, which are without wings, walk with difficulty, and never leave the water, where they live under stones. One of the species, *Amphizoa insolens*, has been collected by the speaker plentifully in California, and another ranged from Fort Bridger to Vancouver Island. It had been supposed that these insects, represented by the two species which were all that had until recently been described, were confined to Western North America. During a recent visit to Paris, however, he had been shown specimens so closely resembling the California insect, that it was with difficulty they could be distinguished as separate species. They had been collected by a Jesuit missionary named David, high up on the mountains of Thibet. Their peculiarities having been indicated by Dr. Horn, the species has since been described under the name of *Amphizoa Davidis*. The extremely wide departure from the supposed geographical range of the insect, made this specific determination one of unusual interest.

ON THE VITALITY OF FROGS AND TOADS.

A CURIOUS CHAPTER IN NATURAL HISTORY.

BY W. P. LIVINGSTONE.

(Concluded from page 184.*)*

IN glancing over the numerous published instances of alleged discoveries of living frogs and toads in the interior of rocks we cannot fail to be struck with the peculiar position occupied by the discoverers. They belong almost exclusively to the class of day-labourers and quarrymen—men, as a rule, not remarkable for general intelligence or accurate observation. Although possessing exceptional advantages for studying natural history, they unfortunately make little practical use of their opportunities, and hence are usually ignorant of even the fundamental truths of the science, and incapable of discriminating between what are facts, and what are only appearances, in nature. From such men we cannot expect a minute and circumstantial account of any unusual incident that occurs in a quarry or pit. A mass of rock is dislodged, and comes crashing down to the bottom, and out from among the *debris* springs a frog or toad; or a piece of rock is loosened, and when removed discloses a cavity, in which one of these animals is snugly ensconced. In either instance the conclusion drawn by the ignorant workmen is the same, viz., that the frog or toad, as the case may be, is contemporaneous with the rock; and while the poor animal is carefully handled, and perhaps taken to some person who is known to be curious about such things, the rocks from whence it sprung are broken up, or the cavity in which it lay is so obliterated by fresh falls of *debris* as to prevent a future examination being made. On questioning the workmen themselves they will almost invariably lead one to believe that they *saw* the rock split up and the animal leap forth. They seem to act in accordance with a preconceived idea of its prolonged *existence*

in the rock, and therefore their statements, however veracious they may appear, should be received with great caution.

Granting, however, that there is a nucleus of truth in many of the recorded cases (and we have no doubt there is), we need not be puzzled for a rational explanation of the phenomenon.

Frogs and toads immediately after coming out of the tadpole condition are very fond of making their way to strange nooks and recesses in rocks and trees where the temperature is favourable and the insects not over cautious. When winter approaches they creep still further inward, and there hibernate until the ensuing spring brings them back to life and matrimony. But if one happened to be disclosed by any uninstructed person while in such a condition, the result, perhaps, would be another "discovery" added to the ever increasing number.

Instead of taking a full grown frog let us select one which still exists in its embryonic condition in the egg. Now a thousand accidents may happen to that egg. It may be washed through some tiny crack into a cavity filled with water in the otherwise solid rock; it may be carried into a damp hollow in the trunk of some stately tree; or it may be swept into a deep fissure in some rocky bank, and in any of these situations it would develope, and pass through all the various stages until it became a perfect frog. The hole or fissure, however, by which the egg entered would be far too minute to allow the passage of the animal either in its tadpole or full-grown state, and consequently there it would have to remain—an unwilling prisoner of the rock. Insects and other small animals would occasionally penetrate to its cell, and on such stray visitors alone it could subsist comfortably for many years.

Now if its retreat were suddenly broken into, and itself exposed to the light of day by one not acquainted with its habits or transformations, he would simply regard it as being of the same age as the rock in which it was found; for, as I have already hinted, the attention is generally taken up more with the animal than with the minutiæ of the cavity of which it was an occupant, or otherwise an examination would probably reveal some means of communication with the outer world.

The same remarks also apply to frogs in trees. As long as the opening admitting insects and moisture did not decrease or disappear, the animal would continue to live and thrive as well as if it had been free.

Such is the explanation now accepted by scientific men of how frogs and toads happen to get confined within rocks and trees. That it is the true one no one who calmly reviews both sides of the question can doubt. The theory that they are coeval with the rocks in which they are found is not only absurd in itself but certainly opposed to all scientific facts. They are said to have been discovered in rocks of cretaceous, carboniferous, and even pre-carboniferous age, whereas a high authority tells us that although both the frog and toad are represented in past time they do not appear to have come into existence till after the commencement of the tertiary period.*

Again, some of the rocks in which they have been found belong to strata that have evidently been laid down in the depths of the ocean, and it is difficult to see how a *living* frog or toad could manage to get emdedded in a deposit existing under such conditions.

As for them being found in igneous rocks, the very idea is absurd. Certain volcanic rocks, such as amygdalord basalt and cellular tuff are full of spherical cavities of all sizes,

* Nicholson's "Manual of Palæontology," p. 350. The same writer in his "Manual of Zoology," 3rd Edit., p. 440. says—"Frogs especially can carry on their respiration cutaneously, without the assistance of the lungs, for a very lengthened period. This undoubted fact, however, should not lead to any credence being given to the often-repeated stories of the occurrence of frogs and toads in cavities in solid rock, *no authenticated instance of such a phenomenon being as yet known to science.*" [The italics are my own.]

and in them any small animal might find a temporary refuge, but we would be rash indeed to assert that they were contemporaneous with the rock itself.

On a subject like this it is well to obtain the opinion of a thorough naturalist like Charles Kingsley, who, as he himself said, "knew almost every case on record." Writing to the Rev. E. P. Campbell, in his own characteristic way, he says:—"Some of these (tadpoles) may get down into cracks in rocks and never get back. The holes may be silted up by mud and sand. The toad may exist and grow in that hole for heaven knows how long . . . for I don't think he would want food to grow; oxygen and water he *must* have, but a very little would do. . . . . But that the toads are contemporaneous with the rock, or have got there any way save through cracks now filled up, and so overlooked in the blasting and cutting, is, I believe, impossible, and cannot be."*

In conclusion, should the reader ever come across one of these reported discoveries let him investigate the matter for himself, and not trust to ignorant eye-witnesses. He should carefully examine the cavity for any hidden or obscure aperture; he should observe the lamination and texture of the rock, and ascertain the formation to which it belongs, while any little circumstance that tends to throw light on the subject should be noted; and by so doing he will, no doubt, help to remove from the minds of the labouring classes many absurd and erroneous notions concerning the vitality of frogs and toads.

* "Charles Kingsley: his Letters and Memories of his Life." Eighth edit., vol. ii., pp. 156-7.

Memory in a Fresh Light.

Little Caddie, four years old, was accused by her mother of having lost her memory, and the child looked bewildered for a moment, and then light seemed to dawn upon her, for she exclaimed: "I dess I know what memory is. It's the ting I fordet wiv."

IS SHE THE MISSING LINK?

THE search for the "missing link" is continued with a perseverance that is worthy not only of a brighter object, but of greater success than has so far waited upon efforts so strenuous and long-continued. From the days of Lord Monboddo to the present time the common relative of man and monkey has eluded the curious research of the scientific gaze. Mr. Farini claims that it may be seen at the Westminster Aquarium in the person of little Krao, a girl of seven, who was brought from the Loo country by Mr. Carl Bock. This interesting creature has been seen by Mr. A. H. Keane, who announces in the *Academy* that, although she presents some abnormal peculiarities, they are not sufficient to justify the claim that she is man's long sought poor relation. Krao has been in London for some ten weeks, and is by no means devoid of intelligence. She is picking up English words, and uses them with a discrimination that argues a knowledge of their meaning as well as of their sound. When Mr. Keane produced his watch the glitter attracted her childish fancy, and she called out "c'ock, c'ock," from which exclamation we may gather that her phonetic habits do not yet include the use of the liquid *l*, and that she is capable of generalising so as to apply the word clock to all timekeepers. She has also a capacity for accommodating herself to a new environment, and is so well satisfied with English civilisation, as seen at the Westminster Aquarium, that she has no desire to return to her own people. Why this not-unintelligent child should be called the missing link will be best understood from Mr. Keane's description:—

"Physically," says Mr. Keane, "Krao presents several peculiar features. The head and low forehead are covered, down to the bushy eyebrows, with the deep black, lank, and lustreless hair characteristic of the Mongoloid races. The whole body is also overgrown with a far less dense coating of soft black hair, about a quarter of an inch long, but nowhere close enough to conceal the

colour of the skin, which may be described as of a dark olive brown shade. The nose is extremely short and low, with excessively broad nostrils merging in the full, pouched cheeks, in which she appears to have the habit of stuffiing her food monkey fashion. Like those of the anthropoids, her feet are also prehensile, and the hands so flexible that they bend quite back over the wrists. The thumb also doubles completely back, and of the four fingers all the top joints independently bend at pleasure inwards. Prognathism seems to be very slightly developed, and her beautiful round black eyes are very large and perfectly horizontal. Hence the expression is, on the whole, far from unpleasing, and not nearly so ape-like as that of many Negritos, and especially of the Javanese 'Ardi.' But it should be mentioned that, when in a pet, Krao's lips are said to protrude so far as to give her 'quite a chimpanzee look.'"

The question will naturally occur whether this hirsute appearance is a mark of race or a disease. Various instances of abnormal development of hair have been recorded, and a family so characterised are said to have resided at the Burmese capital for some generations, and to have been transplanted thither from the Loo country. In that same district Krao was found with her parents, who were equally distinguished by their super-abundant hair. The father died of cholera, the mother was detained at Bangkok by the Government, and the daughter is now introduced to the discerning British public in the hope that she may be capable of satisfying its ardour for the "missing link." From the descriptions of the father he would appear to have been much nearer in appearance to the anthropoid ape. The existence of these hirsute individuals may perhaps be taken as a proof of the past, or it may be the present, existence of a hairy race in Farther India, "a region at "present mainly occupied by almost hairless "Mongoloid people." Further than this the cautious man of science will not go, but holds that the "missing link" is still, *pace* Mr. Farini, in some "undiscovered bourne" whence no traveller has yet returned.—*Manchester Guardian.*

MANCHESTER SMOKE DEPOSITS AND VEGETABLE LIFE.

BY CUTHBERT OXENDALE.

THE effect of our smoke deposits upon vegetation is a grave subject which ought to command the attention of every lover of plant life in Lancashire, and as nothing can better serve to discover the extent of the mischief done in this way, and ultimately lead to a remedy for it than the accumulation of evidence from unbiassed observers, I propose to give a few particulars of what I have personally noticed and gathered from others who have paid some attention to the subject.

The extent to which the smoke from our large towns reaches does not appear to have been pretty clearly defined, but I find that it generally takes several miles ride by rail before we perceive the railway slopes bearing bright clean grass and nicely mixed in variety. In a recent report made by Dr. Edward Hunt to the Barton and Eccles Local Board upon the mischief done to plants in the gardens at Eccles, he expressed the opinion that the traces of chlorides found on vegetation at Eccles, Manley Park, and Alexandra Park, might be derived from Widnes, St. Helens, and Warrington. If this theory be correct, these deleterious substances must travel over twenty miles.

One bright spring day I was walking in the country, six to seven miles distant from Manchester; the wind was coming from the east pretty strongly, and I could very clearly detect at a considerable altitude in the air two distinct lines of smoke, separated by a narrow belt of blue sky; one dark line, I concluded, came from Salford and the other from Manchester. The atmosphere was very dry, and from the tapering form of the two streams of smoke I estimated that they would continue to deposit three or four miles further. A few winters ago, after a heavy fall of snow in the night, with the wind easterly, I observed

large deposits of coal smoke on the face of the snow early in the forenoon. Some of these were nearly as large as a threepenny bit. This was at Seedley, but they rapidly diminished in size as I proceeded westward. I noticed these deposits on the snow as far as Urmston and Flixton, and it was curious to see how much finer the particles became as the distance increased. After several days, with the wind in the same direction all the time, the face of the snow was scarcely so dark at Flixton as it had been the first morning at Seedley.

Within my own observation the effect of soot deposit upon grasses is very bad. The sweeter and more nutritious herbs disappear rapidly under soot deposit, and as a food they are greatly deteriorated. A farm, which was formerly a fairly average one in quality, had two collieries erected upon it, and two successive tenants, who were not bad farmers, lost heavily, and the farm cannot now be let. Knowing the land, I attribute this loss entirely to the smoke and not to any fault of the tenants. An acquaintance of mine, a practical man in every way, lately informed that within his knowledge some meadow land in the Irwell Valley opposite Prestwich was as herby and sweet as any he ever saw. This has, within his memory, largely changed, and the grass year by year has depreciated in quality, the finer herbage disappearing. An able veterinary surgeon has informed me of a case in which a professional brother had charge of a number of horses employed by a large colliery firm, and these animals were constantly ailing. Distressed to discover the cause, he at last suggested that the horses be fed on hay grown in a district where the air was not contaminated by smoke. This proved a sufficient remedy, and the hay now grown on the colliery estate is sold, and fresh is bought.

The effect upon many trees around Manchester has been fatal. While Manchester is a howling desert for trees, it is generally stated that there is not a street in the city of London in which there is not either a tree growing or a growing tree visible. A London friend, who has paid some attention to this matter, informs me that if it is not literally true it is much nearer so than most people would credit. Larch trees are exceedingly scarce in the vicinity of Manchester, though the time can be remembered when they were in tolerable plenty. Several trees planted at Claremont, Pendleton, by eminent visitors to the late Sir Benjamin Heywood, have succumbed within a recent date to smoke deposit.

An intelligent nursery and market gardener, who has gardens about four miles from the Manchester Exchange, informs me that pines could once be grown on his grounds, but he has now had to discontinue them. Red currant trees are not very much affected for fruit bearing, but black currants are not profitable now, although they formerly were. Apple trees will make a fine show of bloom, but just between the flowering and the "knitting" they drop, and come to nothing. Many other plants cannot now be grown, or not with the profit that was possible in former years. Rhododendrons and laurels, and some other shrubs are not very much affected as yet. The opinion of my informant is that the burnt smoke deposit is much more injurious to vegetable life than the deposit from black smoke which has not been turned through a smoke consumer. This agrees with my own observation.

A person at Prestwich some years ago made a wager that he could dig and bag up half a load of potatoes for market in five minutes, which he accomplished, with half a minute to the good. Such crops cannot now be grown in that locality, and he attributes the falling off in productiveness of the soil mainly to the chimney deposits. He was of opinion, with others, that this mischief is on the increase.

Taking a radius of ten miles round Manchester the loss occasioned by these deleterious deposits must be very considerable. A statis-

tician might devote his leisure to worse purposes than that of estimating the loss thus occasioned in beauty of ornamental gardens, and the loss in food production.

Intelligence of a Collie Dog.

Last Saturday evening, some time after dark, the occupiers of a certain farm near Threlkeld, right away in the wildest portion of the Cumberland lake district, were startled by the entrance of a Collie dog they knew. So peculiarly did it conduct itself that alarm was felt for the shepherd it usually accompanied, and with whom it had gone on to the heights of Blencathra earlier in the day. Thompson, the shepherd, was not forthcoming, so a search party was organised. But not until the following Monday was the body, cold and stiffened, of the poor fellow found lying at the foot of a dangerous declivity. Saturday had been stormy, driving clouds of snow and thick mist, at times augmented by a furious wind, making work amongst the sheep particularly dangerous. It is surmised that during one of these showers Thompson missed his track, fell over the rocks, and so met his untimely fate.—*Stock-Keeper*, December 15, 1882.

Smaller Mammalia of Goosnargh.

Mr. Standen's notes on the smaller mammalia of the Goosnargh district was reported in the *Preston Chronicle*, and elicited the following reply:—"Sir, I read with much interest in your columns Mr. Standen's notes on the smaller mammalia of the district, in which he asks for information whether the dormouse (*Myoxus avellanarius*) occurs in this district. It does, or rather did 40 years ago, and there is no reason why it should not still be found in Cuerdale and Samlesbury woods. My friend, Mr. William Ashworth, of Grafton-street, Preston, who can bear out my statements, used to go with me dormouse hunting; some I kept alive, others I stuffed. We generally found them in a snug, warm nest, in very thick wild-rose or what are known as briar bushes. Although they were supposed to be asleep, it must have been with one eye open, to see them bolt out of the nest. The little creature, with its fine, soft, lustrous eye, contrasts strongly with any of its congeners. I need not add it has qualities in common with the rest, it has teeth I know from experience.—Yours, &c., H.

Preston, December 4th, 1882.

STATE ENTOMOLOGY.

WE hope that some day Great Britain will have a recognised State Entomologist, and then we may hope to rival the value and interest of the reports issued by the United States Entomological Commission. The reason for the existence of such a body is of course economical; but in the course of helping the farmer a large amount of help is also given to science. Several of these publications are now before us, and they are all worthy of praise as careful repertories of reading, observation and investigation. An elaborate account of rocky mountain locust and the western cricket is highly creditable to the industry and discernment of Messrs. Riley, Packard, and Thomas. Dr. C. V. Riley's nine reports on the insects of Missouri have been rendered easily available by a general index. Dr. J. H. Comstock, as Entomologist to the Department of Agriculture, has also issued an important report which includes an elaborate study by Mr. L. O. Howard, of the parasites of *Coccidæ*. The report is illustrated by many engravings. Dr. A. S. Packard, Jun. has written a treatise on "Insects injurious to Forest and Shade Trees." The object aimed at, and we think attained, has been to supply, in a brief and compact form, the essential and important information for those who have not the opportunity of referring to more elaborate works. The insects are described in connection with the trees they attack, and whilst a great deal of information is given, the test is made still clearer by wood-cut illustrations. The scientific work that is being done in the United States merits the warmest acknowledgement and the frankest recognition.

Dutchman's Breeches.

In the United States, the name of Dutchman's Breeches is given to *Dicentra Cucularia* on account of the shape of its spurred flower. On this popular name, Miss Rose Terry Cooke has based the following fancy, which appeared a short time ago in the *Independent*.

"Oh! Mamma! Mamma! what do you think?"
Cried out my merry May,
"As sure as you live and breathe and wink,
It's the fairies' washing day.

I've been in the woods with Bell and Grace,
And I know what I talk about,
For under the trees in every place
Their clothes are hanging out.

Tiny breeches, as white as snow,
Hung on the stems to dry,
Swinging and dancing, row on row,
Whenever a wind goes by.

Just as cunning as clothes can be,
Puckered around the band!
But never a fairy could we see,
Not even a little hand.

But, Mamma, they hung no aprons there,
Though we watched and made no noise,
And oh! I'm afraid—and it isn't fair—
That the fairies all are boys!"

Our Study Table.

THE PRACTICAL USE OF METEOROLOGICAL REPORTS AND WEATHER MAPS.--(Washington Government Printing Office).—We have received from the bureau of the Chief Signal officer a series of the circulars and reports issued. These are admirably calculated to facilitate the study of the weather which we may hope to see pass out of the domain of speculation into that of practical science. When this has been accomplished great praise will be due to the hard working and energetic manner in which onr American cousins have worked.

THE INSTANTANEOUS CHEST SQUARER. By *Oliver C. Kenyon.* (Manchester. J. E. Cornish.)—The object of this work is further explained to be the provision of "a Case Maker's Ready Reckoner; showing at one glance the exact contents of any case from one foot to six feet long." The author's long experience has enabled him to simplify an intricate and tedious task, and his book will no doubt be welcomed by the practical men for whom it is intended.

FREAKS AND MARVELS OF PLANT LIFE. By *M. C. Cooke.* (London: Society for Promoting Christian Knowledge.)—Amongst those who have the happy knack of popularising the results of science one of the foremost places must be given to Dr. Cooke, who in this handsome volume has collected together a score of essays dealing with various branches of botanical research. The result of individual investigation are happily blended with the observations drawn from the labours of others, whether discoursing of the gyration of plants, of meteoric flowers, or of luminosity, Dr. Cooke is a clear and safe guide. The book is well adapted for a present to a boy or girl with a taste for science.

DWELLING-HOUSES: THEIR SANITARY CONSTRUCTION AND ARRANGEMENTS. By *W. H. Corfield.* (London: H.-K. Lewis.)—This volume contains the excellent Cantor Lectures of Prof. Corfield. The science of construction has been greatly neglected in the past, and it is a matter of satisfaction that experts should lay down the essentials for a really sanitary dwelling. This is clearly and emphatically done in the present work. It would have been impossible to have dealt with every detail in its narrow compass, but the principles are laid so intelligibly that only their natural development is demanded.

FACTS RELATING TO THE INVENTION OF THE SUBMARINE CABLE. By *R. S. Newall.* (London: E. & F. N. Spon.)—In this small tract Mr. Newall makes a claim which, we think, every reader will regard as fully established—that of having been the inventor of the submarine cable. There would seem to be less scope for dispute on this than on many such points in the history of invention.

NOTE SUR L'OSTEOLOGIE DES MOSASAURIDÆ. Par *M. L. Dollo.* (Extract from the Musée Royal d'histoire naturelle de Belgique.)—M. Dollo proposes to publish by and by a fuller monograph on the remains of the *Mosasauridæ*, but he has rightly thought that it would be well at once to call the attention of naturalists to some new or little points connected with the osteology of these gigantic reptiles. These notes form a paper of moderate size, and will certainly whet the appetite for that larger work which M. Dollo promises.

PAPERS AND PROCEEDINGS AND REPORT OF THE ROYAL SOCIETY OF TASMANIA FOR 1881. (Hobart, Mercury Office.)—It is gratifying to find how actively the colonial societies are working, Doubtless in the future, and even in the near future, the philosophical transactions of Tasmania will assume a more imposing form, but in their present modest garb they contain much that is noteworthy.

A GERMAN-ENGLISH DICTIONARY of words and terms used in Medicine and its Cognate Sciences. By *Fancourt Barnes, M.D.* (London: H. K. Lewis.)—Frequent reference is the only way to test the utility of a dictionary, but we can say that we have tried the compilation of Dr. Barnes, and in each case it has come triumphantly out of the ordeal. We have full confidence in recommending it.

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